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ABSTRACT

This is a collection of papers which resulted from an assignment given in a seminar dealing with the topic Man and His Environment at Phoenix Union High School, Arizona. The interdisciplinary seminar focused on the relationships between man and his physical environment. Its purpose was to introduce the participants to the spectrum of environmental problems confronting people today, to focus on the basic principles and areas of knowledge which apply to each, to explore the resources which are available to solve the problems, and to make a first step toward integrating this material into courses at the high school level. The course dealt successively with ecology, cities, and people; and covered such areas as natural systems, energy sources, pollution, land use, social goals, urban renewal, housing, transportation, new towns, environmental health, and personal space needs. The course was aimed at increasing the participants' knowledge base as a precedent to implementation of this subject area in the high school classroom. (Author/PEB)

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TEACHING IDEAS ABOUT MAN AND THE ENVIRONMENT

prepared by

Project Outreach
An Environmental Education Program

of the

Phoenix Union High School System
Phoenix, Arizona

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INTRODUCTION

By

Robert G. Hershberger, Ph.D.

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The series of papers presented hereinafter are the unedited product of a term paper assignment for the Seminar: AP 415, *Man and Environment* taught by Robert G. Hershberger, Ph.D., Associate Professor in the College of Architecture at Arizona State University. The seminar was conducted first summer session, 1971, under the sponsorship and financial support of PROJECT OUTREACH, a Project of the Phoenix Union High School System, Mr. Lyman L. Jackson, Project Coordinator.

The seminar, which was interdisciplinary in nature, focused on the relationships between man and his physical environment. Its purpose was to introduce the participants to the spectrum of environmental problems confronting us today, to focus on the basic principles and areas of knowledge which apply to each, to explore the resources which are available to solve the problems, and to make a first step toward integrating this material into courses at the high school level. The course successively dealt with ecology, cities, and people, and covered such areas as natural systems, energy sources, pollution, land use, social goals, urban renewal, housing, transportation, new towns, environmental health, and personal space needs. It was definitely "content oriented" in the sense that it was aimed at increasing the participant's knowledge base as a precedent to implementation of this subject area in the high school classroom. Several guest particpant/lecturers from a variety of disciplines greatly contributed to the accomplishment of the course objectives as did a number of carefully selected audio-visual presentations.*

The seminar participants were all high school teachers, most of them teaching in the Phoenix Union High School System. Their areas of specialty ranged widely, including participants with specialties in such diverse areas as mathematics, physics, biology, health, history, government, social studies, language, journalism, physical education, and drafting.* The mixture was very fortunate, a truly interdisciplinary group whose different areas of expertise contributed greatly to the classroom discussions and team presentations.

The purpose of the term papers was to focus on the problems of introducing environmental materials into courses at the high school level and to make positive proposals as to how this might be done. The papers could focus on curricular problems, individual courses, parts of courses, or even one classroom presentation--whatever the participant deemed most relevant to his (or her) teaching responsibilities. The generally high quality and originality of the resulting proposals, while somewhat uneven in form and content as papers, tended to substantiate the instructor's hypothesis that the papers would be best if directed specifically toward application in the classroom. The considerable diversity of approach in the proposals was, of course, greatly appreciated by the instructor, who found nearly every one to be stimulating reading. Hopefully, they will elicit a similar response from the reader. More importantly, may they stimulate the reader to become involved in this area of education which will have such profound effects on our future way of life.

*A complete list of participant contributors is included in the Appendix.

The papers range in approach from Philip M. Berra's very comprehensive proposal which presents a detailed, daily, step by step guide for a three week teaching unit on "The Environment," to the very thought provoking and purposefully unstructured proposal by Sue Malpede to help the student come to an understanding of the effects of heredity and environment on their own lives. In the order of presentation, the proposals covered in the following papers can be briefly (and inadequately) summarized as follows:

(1) "The Environment" a three week teaching unit prepared by Philip M. Berra presents a detailed guide for any teacher who wishes to teach a unit on the environment. It is a very well thought-out and documented unit which the uninitiated teacher should find most welcome.

(2) Charles J. Farrell's paper is similarly detailed and thorough. It includes a series of "Lessons" (some requiring several class periods) which would incorporate environmental materials into the social sciences. Such diverse areas as "police power," the "farming" of natural resources, and comparisons between forms of government and their effect on environment are covered.

(3) Jack Rickard emphasizes Fenton's inquiry approach to teaching in outlining several possible ways to teach concepts of ecology at the high school level. Handout home-reading assignments such as "Can We Survive our Polluted Paradise?" and "Can Law Reclaim Man's Environment" serve as input for class discussions, as do transparency projections of a cartoon, "Man Victorious over Nature," and a chart: "Population Growth." The thoroughness and provocativeness of the various study instruments and questions could account for several weeks of study.

(4) Claudia Lane, in "Perspectives," presents several thought provoking short quotations concerning man's relationship to, and attitudes toward, his environment. After each, she asks several probing questions which should make for exciting and highly educational class discussions.

(5) Mack Stanley advocates the use of John H. Storer's lucid book, The Web of Life, as the basis of a unit of study to provide the high school senior with a primary perspective from which to evaluate the impact of man's activities on the natural systems of which he is a part. The emphasis on individual approach to the subject material of the book would seem to be an excellent way to allow the student to convince himself of the importance of the "Web."

(6) The paper by Eleanor Davey entitled "Air Pollution" is in two parts. The first part provides an excellent summary of the air pollution problem. The second part illustrates several laboratory experiments which students can perform to learn about air pollution. A number of other topics for experiments are outlined. Here again, teachers in the physical and biological sciences within the system could adapt these experiments for use in their own classroom.

(7) Thomas Messner has provided a detailed outline of a five week unit on ecology intended to be a part of a year-long biology course. It includes an "Introduction to Ecology" in which lectures, films, and discussions, as well as student magazine/newspaper reports and topics for a major paper, are set forth. Very interesting data and suggestions for laboratory experiments are set forth relative to the physical and biotic factors necessary for life. Population sampling techniques are set forth to demonstrate the geographic distribution of organisms. A final area of study deals with the conservation of natural resources. Any high school biology teacher could profit greatly from reviewing this and Mrs. Davey's paper.

(8) Marvin E. Sounart's paper entitled "Applied Arithmetic in Ecology" presents a number of mathematical problems oriented toward current ecological concerns in the Southwest. It is a fine example of how the teaching of mathematics can be applied to the Man-Environment interface. Indeed, all of the problems (and answers) could be used as presented as a mathematics unit throughout the Phoenix Union High School System.

(9) William H. Rosenberg's paper, "Saving our Environment through Education," calls for the presentation and discussion of ecological considerations in technical and vocational shops. The obvious connection between automotive, aircraft, metal and wood working, plastics, and machines of all kinds in the utilization of natural resources, energy supplies, and their by-products, including pollutants, would appear to make the technical areas ideal for introduction of concepts of ecology. There remains the need to develop specific units of study to incorporate in each of the technical areas.

(10) Catherine Meibert describes in her paper a unit on ecology actually conducted in the Phoenix Union High School System by Mrs. Judith Harkleroad during National Earth Week, April 19-25, 1971. She suggests that Journalism students could be assigned to report on similar units being conducted within the High School System to introduce Journalism students to environmental concerns while accomplishing the usual objectives of a Journalism class.

(11) Regna F. Breneman demonstrates very effectively how concepts of ecology can be incorporated into a Camping Unit in Girls' Physical Education, both in preparations for camping outings, and in the very conduct of the outing. She thus presents a very stimulating approach to what could easily be a rather pointless and even hazardous foray into the unknown.

(12) John and Marilee Murray have combined their backgrounds in social sciences and chemistry to propose an interdisciplinary unit. Their proposal is to study the political structure of Phoenix as a mechanism to solve the problems of energy consumption, land despoilation, and pollution caused by its rapid growth. The paper provides basic facts in each area and suggests a variety of ways to expand the student's information base as well as how they might participate in the formulation of city policies in these areas.

(13) Martha Hunter's paper on "New Towns" outlines a unit of study aimed at exploring the rise of new towns in the U.S.A. and abroad. She presents an excellent summary of the new town movements in England, Sweden, Finland, and the U.S.A. She then presents a very thorough set of criteria and methodology for comparing "new towns" in Arizona with those elsewhere. She proposes as a final project the planning of a "perfect desert town" by members of the class. All told, this could be a most interesting and informative unit of study.

(14) Judith Gilbert's paper, "A Comparison of Cultural Differences on Man's use of Personal Space" takes a rather different approach from most of the other papers and explains the relationship between an individual and his spatial environment. She specifically compares the Americans with the French in their use of space--personal to city scale--and suggests how such material can be incorporated into language courses. This paper demonstrates very well, I think, that we cannot focus exclusively on the physical effects of man's activities, but must also focus on the social/psychological relationships which will allow men and nations to work effectively together to reach a common goal.

(15) Barbara Sue Halpede's paper "The Individual and his Environment" also emphasizes the necessity for an individual to understand his place in the man/environment equation. She presents a way, almost through introspection, that the members of a class could come to understand the influences of heredity and environment on their own lives. She presents specific proposals relating to the effect of family on the individual. Like most of the papers, this is a thoughtful and stimulating proposal on how to introduce high school students to the issues of Man and Environment.

THE ENVIRONMENT

by

Philip M. Berra

EXPLANATION OF THE PAPER

This paper is a three week unit on "The Environment." It is written so that one who reads this paper should be able to teach a three weeks unit on this topic. Included herein are all resources which could be used on this topic - from teacher material, to "class-sets" material, and audio-visual aids.

The bibliography at the end of the paper is an attempt to give the teacher a summary of the many resources which may be used to help teach this unit. Those books and articles listed may be found in any library or well-stocked bookstore.

The paper is written on a day-by-day approach, with each day given to particular teacher sources and material; student assignments and projects; audio-visual aids; or any other activity deemed necessary to reach the desired goal.

INTRODUCTION

America must look to its resources as never before. Population growth and the migration to the city, technological change, and use of natural resources, have brought about vast increases in energy, mineral, and raw material consumption. With this use of our resources comes the problems of pollution, and destruction of these resources through their uncontrolled use.

This process shows no signs of diminishing. It affects all areas of society, from the rural areas to the vast metropolises which are continually growing throughout our land.

The purpose of this unit is to encourage students to explore concepts that deal with the relationships between man and his environment. It will help students understand how man has used his environment as well as how environment has affected man. The student should, by the completion of this unit, develop some defensible, though tenative, generalizations. Much of what is presented will raise valuable questions, thereby allowing students to learn to analyze a number of positions on an issue, and defend these positions by logical reasoning, and express and defend their own ideas on a question.

DAY ONE

I. Introduce the unit by explaining what ecology is as it pertains to the student and their society. Include in this introduction for the students ideas on the following areas:

a). The Historical Roots of the Ecology Movement - using the basic source of The Environmental Handbook, p. 12.

b). The City and the Environment - using as the basic source The Death and Life of Great American Cities, by Jane Jacobs.

II. After the introduction is presented, the film "Environment" will be shown (source District Film Library). The film goes beyond the general rhetoric of ecology and asks the question: "what balance must be met?" between the destruction and the fact that our needs must be met.

III. Allow students to read in the area of Ecology on their own from Library sources, to be prepared to discuss on DAY THREE in class.

DAY TWO

I. The students should have some time to spend on reflection of the preceding day's schedule, with the teacher. This may take more or less time, as desired by the teacher.

II. A. Using the American Educational Publication "The Conservation Story: A Background for Understanding Today's Crisis," the students will spend class time reading only those sections which the teacher deems important for his own particular goals. The last section of the pamphlet "Conservation and Your Community (pp. 43 - 46) is used to allow the student to gain a knowledge of what may be done on his own and in his community.

B. With this particular publication, a dittoed questionaire will be handed out to the students so that they may follow many of the important points brought out in the pamphlet, and which may be used as a helpful guide for leading the students into discussion about the material.

C. Depending on each specific classroom situation, after time has been given for the students to read and follow the given dittoed questionaire, discussion on this material should commence.

DAY THREE

I. If necessary, continue the class discussion of the AEP "The Conservation Story," allowing the students to react to what they have read, and draw their own conclusions.

II. Using The Web of Life, by John Storer, as a reference, the teacher at this time will show what the ecosystem is and how it functions -- with all of the inherent ramifications to the student and his life.

III. The students who completed their introductory reading assignment given on DAY ONE, should at this time discuss these readings -- this will give the teacher an idea as to what the students are reading, and what they think in terms of this unit.

IV. A short film dealing with the involvement of the student will be shown here: "Our Land Needs Your Help" -- makes the student aware of what he can do on an elementary level, hopefully showing a practical side to this environment problem.

DAY FOUR

I. Speaker from the Maricopa County Health Department talking about control of pollution -- laws, ordinances, etc. He will bring with him all the necessary materials with which to make his presentation.

II. Discussion of speaker with students after speaker has departed. Important here is the relevancy of his remarks to our particular unit.

III. At this point, an exam will be given emphasing the basic ideas referred to during the last four days.

DAY FIVE

I. Begin showing the sound-film strip "Crisis of the Environment" which is divided into five areas. With each segment, there is a teacher guide to follow and which will give the teacher some specific student assignments to help them follow the different units.

   A. "Man: An Endangered Species?" begins this sound-film strip series. A student outline, following the one suggested in the Teacher Manual, is to be used; along with the "questions for discussion" so that the students might be involved in class participation when the film-strip is completed.

II. Student Involvement Project: Camera Project.

The project involves the entire class working in groups (if desired) Cameras are the important element to this project. The assignment involves the student taking pictures of the environment -- that part which concerns them. At the end of the unit, or toward the

II. Con't.

end, these pictures are then shown to the class and "rated" -- from the least liked to the best. This allows the students to rate the environment and shows them what their classmates consider desirable or undesirable qualities of the environment.

DAY SIX

I. A. Part II - "Breaking the Biological strand," of the sound-film strip "Crisis of the Environment" is to be shown at this time. Introduction to this particular part will include a dittoed handout with an outline of this particular film strip, plus "questions for discussion," which could be used as a basis for discussion with the class at the end of the film strip.

B. After the film strip, there should be some discussion in terms of the students' reactions to what they saw. The teacher will have the class write about these reactions rather than talk about what they feel.

II. At this point, in order to change the direction of looking at the environment, the teacher will introduce to the class, material dealing with environmental poetry or music.

Hand out to the students dittoed copies of "ecology poems" and ask them, after giving them time to read, their reactions to what they have read. This is a verbal reaction, which will pose some problem for the teacher in eliciting responses from their students. The point here is to give students a chance to talk about what they feel the poetry represents; and gives them a chance to express ideas.

DAY SEVEN

I. Some part of this day will be used to talk to the students about their projects and advancement thereon. It should be noted that there is no "due date" for these projects, except as the teacher desires in relationship to the end of the unit.

II. Concentration on population begins here. The teacher will attempt to merely present the information factually -- attempting to have the students form their own opinions at the end of this presentation.

   A. Paul Ehrlich's "Too Many People," an excerpt from The Population Bomb is to be used as an introduction to this particular problem. Teacher explanation of all facets of this particular article will help students be aware of what Mr. Ehrlich's ideas say.

   B. Show "Population Ecology" an Encyclopedia Britannica Films presentation. This film analyzes biological principles of environment and eventually shows the problem created by a surplus birth rate and the sociological implications involved. Student reaction to this film might be helpful in determining what was gained by the student.

DAY EIGHT

I. Continuing DAY SEVEN's Population exercise, and using "The New York Times Magazine," Feb. 9, 1969, p. 32 -- David Dempsey's "Dr. Guttmacher is the Evangelist of Birth Control." This article may be used to give students insight into another area of the population problem -- the teacher of course giving the information to the students as he sees fit.

DAY EIGHT Con't:

II. Turning again to the "Crisis of the Environment" series film strip, the last half of Part V: "Population Explosion" is used here (from slide No. 29 to the conclusion). This will give students more information on this particular aspect of the Population problem.

III. From these two events (I & II) the students are given a dittoed outline of the material -- and this outline will be used as a reference point for discussion of the preceding material. The teacher will discuss this material as he sees necessary to do so.

DAY NINE

I. A speaker from the Arizona Sierra Club will begin this day by presenting materials which this particular group has to offer.

II. If time permits, reaction to the Sierra Club's speaker will be sought from the class.

This entire day will be given to this speaker.

DAY TEN

I. To follow the Sierra Club's speaker, the film "Grand Canyon" is to be used (District Film Bank). It deals with much of what was discussed on DAY NINE - specifically containing information of the Grand Canyon.

II. The teacher will summarize the two days' presentation and receive comments from the class. The summary is important at this time, because DAY ELEVEN will bring a speaker from the Arizona Mining Association to present the students with the "other side" of the pollution problem.

DAY TEN Con't:

III. In order to introduce DAY ELEVEN's speaker, information from the Association is passed out to the students, giving them time to review the material.

DAY ELEVEN

I. Speaker from the Arizona Mining Association. This person supposedly will present the "industry side" of the environment question. His presentation will include slides, charts, and factual material thereby enabling students to compare this presentation with the preceding one from the Sierra Club.

II. After the speaker has presented his material -- show the movie "Santa Barbara -- Everybody's Mistake" which will attempt to show students that much of the environmental issue has all facets of society involved; and that possibly there is no one main villian. (District Film Library)

III. It is up to the teacher to draw together all the points which the two speakers and the film have made - showing how they compare or contrast with each other.

DAY TWELVE

I. As a written assignment, the students will now be asked to decide with the materials they have-which of the speakers they best identified with; and why! It should be emphasized that the teacher is interested more in specific responses, rather than broad, generalized, feelings. This particular assignment will last between a half to three-quarters of an hour, including all explanations of the assignment and discussions pertaining thereto.

Day Twelve Con't.

II. The unit will now concentrate on animal life and the environment. Part III of Crisis of the Environment: "Vanishing Species" will be shown as introductory information to this segment. An introduction should be dittoed plus the "questions for discussion" -- to be used at the end of the film strip for class reaction purposes.

DAY THIRTEEN

I. A. Because of students' closeness to the desert, using The Silver Burdett Reading and Research Program on "The Desert," have the class read Chapter Four on Animals -- thereby giving them an idea of the types of animals which live in their surrounding area. This is merely an exercise in information -- assuming that many of the pupils have no contact with animal species other than domesticated animals.

B. With the preceding film strip as background discuss with the class what possibilities might come to these particular desert animals if environmental protection is not used. Do these students know of any specific examples???

II. The teacher will introduce information concerning some specific species which is endangered . . . .

III. The movie "Ark" -- Arthur Barr Productions, Incorporated (District Film Library) will be shown at this time. This seems to be a good follow-up to the presentation given by the teacher on vanishing species.

DAY FOURTEEN

I. The last part of this unit will deal with what is being done; or what has been done; in facing the environmental problems. Using the Guidance Associates film strip "Man's Natural Environment: Crisis Through Abuse," Part II (District Film Library) the student is introduced to this aspect of environmental control.

Before the film strip, hand out a copy of those "questions for discussion" found on page 12 of the manual. These are not necessarily pertaining to Part II, but are general enough to elicit conversation following the film strip.

II. The "camera project" will be due at this time. Those students which became involved with this project will be allowed to discuss it with the class. As mentioned on DAY FIVE, this project is to be directed as the teacher sees necessary.

III. Part I "They Care for the Nations: Mission Possible" (District Film Library). This film fits well with the goal of this part of the unit. Instead of posing problems -- which hopefully the students are now well aware -- the film talks of solutions to these problems. The class is presented here with a rather optimistic approach to this unit.

✓ DAY FIFTEEN

I. Part II "They Care for the Nations: Mission Possible."

II. A general summary of this film is presented to the class, and their reaction to the film will be discussed.

III. This last section is to be used for testing students on this unit. There is no specific suggestion here as to how the teacher will devise this testing.

BIBLIOGRAPHY

DAY ONE

1. The Environmental Handbook, Garett de Bell, ed.
2. The Death & Life of Great American Cities, Jane Jacobs.
3. "Environment" - District Film Library, 28 minutes

DAY TWO

1. "The Conservation Story: A Background for Understanding Today's Crisis," American Educational Publications. (Class Set).

DAY THREE

1. The Web of Life, John Storer.
2. "Our Land Needs Your Help," District Film Library, 13 minutes

DAY FIVE

1. Poetry, U.S.A., Paul Molloy, ed. Scholastic Book Services, New York, 1968.
2. 100 Plus American Poems, Paul Molloy, ed. Scholastic Book Services, New York, 1968.
3. Reflections on a Gift of Watermelon Pickle . . . and other Modern Verse. Dunning, Lueders, and Smith, eds. Scott, Foresman and Company, 1966.

DAY SEVEN

1. The Environmental Handbook, Garrett de Bell, ed. p. 219 "Too Many People," by Paul Ehrlich.
2. "Population Ecology," Encyclopedia Britannica Films, District Film Library. 19 minutes

DAY EIGHT

1. "Dr. Guttmacher is the Evangelist of Birth Control," New York Times Magazine, Feb. 9, 1969, p. 32.
2. "Crisis of the Environment" film strip, Part V, beginning with slide No. 29 to completion.

DAY TEN

1. "Grand Canyon," District Film Library. 28 minutes.

DAY ELEVEN

1. "Santa Barbara -- Everybody's Mistake," District Film Library. 30 minutes.

DAY TWELVE

1. "Crisis of the Environment" film strip, Part III.

DAY THIRTEEN

1. The Silver Brudett Reading and Research Program: The Desert, A. Starker Leopold, ed. Life magazine series, Silver Burdett Company, New Jersey, 1964.

2. "The Ark," District Film Library. 20 minutes.

DAY FOURTEEN

1. "Man's Natural Environment: Crisis Through Abuse," Guidance Associates film strip, Part II. District Film Library.

2. "They Care for the Nations: Mission Possible" Part I District Film Library. 30 minutes.

DAY FIFTEEN

1. "They Care for the Nations: Mission Possible," Part II District Film Library. 30 minutes.

Environmental Materials in the Classroom

By

Charles J. Farrell

INTRODUCTION

This is an effort to focus on the relationships between man and his physical environment in courses such as American Government and American Problems.

A series of lessons is included to demonstrate the techniques which can be used to incorporate environmental materials into the social science curriculum.

It is hoped that this will demonstrate, to some degree, the values of the interdisciplinary approach.

CONCEPTUAL SCHEME GOVERNMENT IS AN INTERACTION OF CUSTOM, RULE, AND LAW

LESSON THE INTERPRETATION OF FREEDOM OF ASSEMBLY IN THE FIRST AMENDMENT OF THE CONSTITUTION

CONCEPT Life within a group imposes duties and responsibilities as well as entailing rights and privileges.

PURPOSE OF LESSON To investigate the varying interpretations of the phrase "freedom of assembly" in the First Amendment.

DEVELOPING THE CONCEPT In addition to the following general questions, ask any others that would be pertinent to specific news articles.

1. How and why did freedom of assembly originate?
2. When does it cease to be a right and instead become a burden on society?
3. How does a community prevent this from happening?
4. Why do many people fall into two groups: one which says that assembling is subject to local laws and is therefore illegal under certain conditions, and the other which maintains that the Constitution of the United States permits complete freedom of assembly?

EXTENDING THE CONCEPT Classroom discussion can center around the articles submitted by the students. Point out the conflict between local ordinances and the First Amendment of the Constitution.

FIXING THE CONCEPT Arrange a debate on the interpretation of this section of the Constitution with respect to local laws. Which takes or should take precedence over the other? The other basic freedoms: press, religion, and speech could be discussed in the same manner.

INSTRUCTIONAL MATERIALS Current newspapers and magazines.

LESSON WISE USE OF FORESTS MAKES THEM AVAILABLE CONTINUOUSLY

CONCEPT Wise use of community resources tends to assure availability.

PURPOSE OF LESSON To help students understand the contributions of the forest to man's needs.

INTRODUCING THE CONCEPT Exhibit in the classroom charts of the American Forests Products Industries, Inc., on the following subjects:

1. Forests and Trees of the United States.
2. Growth of a Tree.
3. Products of the Tree Farm.

DEVELOPING THE CONCEPT From each chart ask related questions:

1. Forests and Trees of the United States:
   How important is the wood-using industry? (Specifically relate questions to your own area.)
   a. How does your local forest compare in lumber and pulpwood production in the United States?
   b. What accounts for this?
   c. What types of trees are produced there?
2. Growth of a Tree:
   a. How can we help trees grow?
   b. What are the major forest enemies?
   c. Besides commercial products, what else are trees good for?
   d. Why is it important to know what conditions are best for the growth of trees?
   e. How does this knowledge affect us locally?
3. Products of the Tree Farm:
   a. What is the main purpose of such a farm?
   b. What kind of a farmer is likely to engage in tree planting?
   c. Why is it good to grow trees and harvest a crop, as you would field crops?
   d. How many products can you name that come from a tree?
   e. How many of these industries are in your area?

EXTENDING THE CONCEPT Students may make field trips to whatever wood industries are near, such as a plywood manufacturing company, a sawmill, a lumber mill, a paper mill, a furniture factory, the office of a broker for woods industries. They may also visit controlled forests planted by educational groups and wooded areas where trees grow at random. From this investigation they can make comparisons. Pamphlets on the advantages of tree farming can be ordered.

LESSON (cont.)

FIXING THE CONCEPT Students may write a paper or have a classroom discussion of the following:

1. How the wise use of forests can benefit a community, such as income, shade for parks, picnicking, camping, retaining soil and water, fishing where streams are available, homes for wildlife which aid farmers and provide hunting.
2. A comparison of scientific tree-farming methods with haphazard practices.

INSTRUCTIONAL MATERIALS

Posters
"What We Get From Forest Lands"--USFS
"What We Get From Trees"--USFS

LESSON DEPARTMENT OF THE INTERIOR--FISH AND WILDLIFE SERVICE

(CONSERVATION OF RESOURCES)

CONCEPT Governments are developed to establish rules for the conduct of groups and individuals in a community.

PURPOSE OF LESSON To investigate the reasons for the establishment of government agencies for the protection of fish and wildlife.

INTRODUCING THE CONCEPT Exhibit pictures illustrating the following and make comparisons when possible:

1. A clear, moving stream well stocked with fish.
2. A sluggish river filled with rubbish.
3. A beautiful forest.
4. Bulldozed and cut-over forests.
5. Lands that have been strip mined.
6. Abundant animal life in a wooded land.
7. Tidal marshes.
8. Filled-in marshland.

DEVELOPING THE CONCEPT Investigate:

1. Why does a community need clean rivers?
2. Why can't fish live in sluggish, polluted water?
3. Where do streams originate?
4. What purposes do trees accomplish in mountain areas?
5. What does improper cutting do to forested land?
6. What types of habitats do various species of wildlife prefer?
7. How does strip mining affect land?
8. What good are tidal marshes?
9. How does dredging affect them?
10. Why do some people want to fill in the marshes?

EXTENDING THE CONCEPT Investigate:

1. If your local governments have passed ordinances or laws on conservation, what are they? State and federal laws?
2. What is the reaction of citizens in your area to a decrease in fish and wildlife resources?
3. What are they to gain by being aware of and concerned with the need for conservation of both?
4. Why is it, perhaps, necessary for government to intercede?
5. If tourism is a big industry in your community, how is it affected by a loss of fish and wildlife, polluted streams, or torn up woodland?
6. How is recreation affected by any of these problems?

LESSON (Cont.)

Have the students survey their own community and determine which, if any, of these problems exist there. Have them suggest what can be done to solve the problems, the course they should follow to change the existing situations, the organizations which might help, and the officials to visit. Then let the students carry out the plans made in class.

INSTRUCTIONAL MATERIALS

Films

Films and teaching materials from the Fish and Wildlife Service, USDI and your state wildlife agency.

LESSON OUR NATIONAL PARKS

CONCEPT Governmental policies in a region affect and modify the interests of the region.

PURPOSE OF LESSON To help students understand that for the sake of natural beauty, historical significance, and scientific value, national parks and monuments should be maintained for future generations to enjoy.

INTRODUCING THE CONCEPT Display pictures of the national parks or any scenes of wilderness areas. Collect several copies of the National Geographic of July 1966 and have the students skim through the articles pertaining to the national parks. Place the map from that issue on the wall and pinpoint the different parks.

DEVELOPING THE CONCEPT

1. What federal agency administers the national parks and monuments? Where was it organized?
2. What is the park nearest you? How far is it?
3. What others are not too distant?
4. If you have been to any national parks, what was your reaction to them?
5. Why are they important to us?
6. Why is the restoration and preservation of historical landmarks important?

EXTENDING THE CONCEPT Have the students watch newspapers and magazines for articles concerning the park system. Have them write the following for additional information:

The Wilderness Society
The Sierra Club
The National Park Service, USDI

Investigate these acts which have been passed by Congress:

National Park Act, 1916
Wilderness Act, 1964

Discuss these problems and possible solutions with relation to national parks:

1. The proposed highway through a wilderness area in the Great Smokies National Park.
2. The profit motive in tourism.
3. Commercial interests in the wood industries.

Have classroom discussion on the following:

1. Which course would you prefer to pursue with regard to wilderness areas and places of historical interest?
    a. Leave them intact?
    b. Permit government to protect or develop them?
    c. Allow private companies to develop them commercially?
2. What are your reasons?

LESSON THE ROLE OF GOVERNMENT 'POLICE POWER' TO MAINTAIN THE FITNESS OF THE ENVIRONMENT

CONCEPT Local government is an invention of man to maintain the fitness of the environment.

PURPOSE OF LESSON To help students understand how government aids man in his struggle against epidemics and communicable diseases, and protects a community's health and safety.

INTRODUCING THE CONCEPT Draw some panels of "stick" pictures on a long sheet of white paper. Include each of the following:

1. A city garbage truck filling in marshland.
2. A half-built house connected to a sewer line.
3. Septic tank in a municipality.
4. Sign saying QUARANTINED-DIPHTHERIA on a dwelling.
5. Warehouse with rats eating flour and rice.
6. Truck driver buying pills to keep him awake.
7. License for medicine or dentistry.
8. An ocean-going freighter with its hawser fastened to a post on the wharf and a big rat stopped from going ashore by a shield.

DEVELOPING THE CONCEPT Ask questions concerning each panel:

1. For what two reasons to cities dump garbage on marshlands? If you were a nearby resident, why would you object to this practice? If you were a public health officer, would you object? Why?
2. Why do incorporated towns generally require homes to be connected to a city sewer line? How can they justify their requirement?
3. In what areas would septic tanks be permitted?
4. Why do cities, in particular, quarantine homes where there are sign of contagious disease?
5. Why are rats attracted to farm warehouses? Why do health inspectors destroy food where rats have been? Why are warehouse owners often prosecuted under the law?
6. Why would a truck driver take wake-up tablets? What effect have these pills had on long-distance haulers? Where have major wrecks occurred which investigators determined might have been caused by the use of such pills?
7. Why do most states require licenses in the practice of medicine and denistry? What do you think of this?
8. Why is the shield on the hawser? What is the bubonic plague or "Black Death"? What is the connection?

FIXING THE CONCEPT Have a classroom discussion on all the information acquired from the speakers and the correspondence. Students can also discuss ways by which their cooperation will result in a more sanitary environment.

LESSON OVERPOPULATION--A CONTRIBUTING FACTOR IN WATER POLLUTION

CONCEPT National and local units interact to maintain the development of the environment.

PURPOSE OF LESSON To help students understand how an increase in population poses community problems related to the quality and quantity of water.

INTRODUCING THE CONCEPT Place two jars of water on the table (one very clear, and the other with sediment you can stir to make it dirty). Behind the clear jar, put a sign which says SWIMMING ALLOWED. Also have a sign saying NO SWIMMING ALLOWED placed behind the dirty jar. Across the front of the room pin up a long sheet of drugstore bond (white wrapping paper) on which are illustrated the following:

1. A meandering river--on the banks of the river "stick" pictures of an industry pouring wastes into the river.
2. A city's raw sewage flowing in.
3. An outhouse on the bank.
4. People swimming.
5. Cattle drinking.
6. Any boats (especially cabin cruisers and larger) dumping garbage.
7. A town or a farmer digging a deeper well for water.

DEVELOPING THE CONCEPT

1. What do you deduce from the clear jar? From the dirty jar?
2. Have you ever seen signs such as these? If so, where?
3. If not, why haven't you?

About the long picture, ask:

1. Why do industries put wastes in the water?
2. What is the detrimental effect (acids, etc.)?
3. What happens where many industries follow suit?
4. From the standpoint of sewage, what happens as the population grows?
5. Why do small towns seldom have sewage-treatment plants?
6. Why should they have them?
7. Why is it dangerous for people to swim and ski in polluted water?
8. Why should individuals not throw garbage out of boats?
9. Why is it necessary to dig deeper wells?
10. What effect does a lower water table have on the economy of a community?

EXTENDING THE CONCEPT Students can go to the mayor of a town or to the Health Department to determine:

1. What types of laws govern pollution of water, if any.

LESSON (Cont.)

2. Why a city claims it can't afford a sewage-treatment plant.
3. The possible effect of a typhoid epidemic in a given area.
4. What happens when a rural area, where animals graze near a river, has flood waters over a period of time.
5. Why too many septic tanks in a low area (around a lake) could constitute a health hazard.
6. How the town remedies the problem of a lowered water table.

Students in coastal areas can check with the Bureau of Commercial Fisheries on the recent hypothesis that domestic sewage might be changing the size of diatoms that shrimp feed on in inland coastal waters. What is the relationship of the population increase to the shrimping industry?

Have some students find out whether industries are making a constructive effort to halt the pollution of water. If they are, how are they going about it?

Students investigate and learn that if individuals within a small community are conservation conscious, there need not be a problem from all these situations. However, in most areas it takes the force of laws to prevent water pollution and the same force to maintain unpolluted water. Thus, in two ways, national and local governments need to cooperate because:

1. Streams and lakes often border several states, thus becoming classed as interstate commerce.
2. The cost of enforcement and prevention is often prohibitive for local areas.

FIXING THE CONCEPT Have the students discuss the following question: When contamination of water has been proven and swimming, etc. is no longer feasible, can you as an individual do anything to change the situation? Could you have prevented it?

INSTRUCTIONAL MATERIALS

PAMPHLETS

Pamphlets from U.S. Department of Health, Education, and Welfare.

LESSON WISE USE AND CONTROL OF AIR

CONCEPT Regional and local government organizations are modifying their procedures for interaction.

PURPOSE OF LESSON To show the situations and circumstances which indicate that regulation of air from the standpoint of both pollution and usage is becoming a necessity.

INTRODUCING THE CONCEPT On a long sheet of white wrapping paper draw "stick" figure cartoons with magic marker, as follows:

1. Show how the control tower of a large airport "stacks" planes, according to altitude, to bring them in.
2. Residences near a busy airport and a low-flying plane ready to land.
3. In the next three panels, under a layer of smog, depict a group of:
   a. Expiring "stick" people piled on top of each other.
   b. Some female "stick" figures with stockings disintegrating.
   c. Huge fog lights and smoking exhausts on cars making their way through smog--a few wrecks alongside.
4. Manufacturing plants pouring noxious fumes into the air and dirty-looking people holding their noses.

DEVELOPING THE CONCEPT Ask questions about each of the cartoons.

1. a. Why do airport towers tell pilots which flight plan to follow in a landing?
   b. How does a pilot know at which altitude to fly, anywhere in the United States?
   c. What does a pilot do when he sights another plane?
   d. What federal agency has control of planes and airspace?
2. a. Why do people who live near a large airport worry about the planes overhead?
   b. What effect do jets have on them?
   c. What has happened in the past to people in these areas?
3. a. What is smog?
   b. Where do you usually find it?
   c. What is its danger?
   d. What has the State Legislature of California done about it? (If students do not know this, it can be brought out in EXTENDING THE CONCEPT.)
   e. How has the federal government showed its concern over the problem?
4. a. Why are people prostrated on the ground?
   b. Why are others holding their noses?
   c. What could be coming from the belching smoke stacks?
   d. What effect do these fumes have on humans?
   e. What is being done about it?

EXTENDING THE CONCEPT Have the students write to the Attorney General of California for information concerning the smog, the number of accidents attributed to it, how they control traffic when it is heavy, and the recent law passed by their legislature concerning an attachment on automobiles to lessen fumes.

They can write to Pittsburgh, Pennsylvania concerning its industrial clean-up campaign and the results.

Ask students whether their own neighborhoods have obnoxious odors from industries.

Ask them to check the work of the Civil Aeronautics Authority. Have them investigate the increase of chemicals in the air that cause disintegration of nylon hose and are responsible for respiratory ailments such as emphysema, bronchitis, etc. Ask one to report on carbon monoxide as a cause of automobile wrecks in traffic-chocked cities.

Ask the students who have received any of the above information to research newspapers and magazines for related articles concerning air as a resource, and how control of air space is becoming a factor in man's thinking. (For example: The owner of ocean front property was awarded compensation by the United States Court of Claims for not being able to develop property over which the flight pattern of a United States Air Force base lay.)

INSTRUCTIONAL MATERIALS

Write to California Attorney General; Pennsylvania Chamber of Commerce at Pittsburgh; New Jersey Attorney General, about New Jersey Turnpike; State agencies on pollution control.

LESSON CAPITALISM, SOCIALISM, AND COMMUNISM

CONCEPT Nations develop economic systems in relation to the availability of resources.

PURPOSE OF LESSON To help students understand the basic economic beliefs of capitalism, socialism, and communism; the use of resources in various countries; and the connection between the resources available and how each county developed its economic system.

INTRODUCING THE CONCEPT Label three charts: CAPITALISM, SOCIALISM, COMMUNISM.

1. Define each on its chart.
2. List pertinent questions on each, such as: Who owns a home under each system? Who owns a business, a farm? etc.

DEVELOPING THE CONCEPT Capitalism:

1. What does free enterprise mean to you?
2. What do you or your family own, or what can you own in the United States?
3. When was the United States covered with bountiful forests?
4. When did the United States have coal mines in which the coal was accessible?
5. What is the power potential of water in the United States?
6. How much arable land did the United States have?
7. How did these contribute to or aid in the adoption of the capitalistic economic system?
8. How do people fit into the development of capitalism--with particular reference to the United States?

Show the film: WHAT KIND OF GOVERNMENT HAVE WE? which depicts the essential attributes of democracy.

Socialism and the Welfare State:

1. How do you explain each of these factors in the definition of a socialistic or Welfare State: production, distribution, and exchange?
2. What basic resource does Denmark lack?
3. Which resource does it utilize the most?
4. Why would cooperatives be a necessity in the dairy industry there?
5. What does Denmark do with its products?
6. In Great Britain, name several basic resources that are lacking.
7. What has each contributed to Great Britain's wealth--land, coal, water power, people?
8. What change has come over Great Britain in the last century in each of these areas?

Show the film: Sweden.

LESSON (Cont.)

Communism:

1. What basic resources does the Soviet Union have?
2. What resource could it use more of?
3. Why were the Russians, before 1917, not able to advance as far as the West with their resources?
4. What did the people lack?
5. Why were they thus 'ripe' for communism?
6. How did some (Kulaks) react when they realized what was happening?

EXTENDING THE CONCEPT Investigate:

1. In the United States, how did the closing of the frontier have an effect on capitalism?
2. What other developments in the Midwest and the West began to change the form of capitalism?
3. Why is the United States making a transition towards a more socialistic society?
4. How did the type of immigrants affect this transition?
5. What effect has population growth had on each natural resource?
6. Why has Great Britain slowly changed to a 'welfare state' -- socialized medicine, housing subsidies, etc?
7. What is the relationship between resources and the economic system there?
8. What has caused these changes in Great Britain?
9. Why can you say that Great Britain has been wavering between capitalism and socialism?
10. In Russia, why did the communist theoreticians claim that they needed government ownership of everything?
11. In recent years, how is the system changing in the USSR?
12. Why is the country being accused of permitting some capitalism?
13. Why is it being done?

To illustrate the differences among the three major economic systems, take one natural resource, such as forests. Ask:

1. Who owns the products?
2. Who owns the plants that manufacture the products?
3. Can anyone buy a share of stock in these industries?
4. What proportion of income goes into taxes?
5. Under communism in the USSR, who owns the trees?
6. Who owns the industries?
7. What is done with many of the forest products?
8. Why do people not have homes such as we have in America?
9. Is there such a thing as profit?
10. In a socialistic community, who probably owns the trees?
11. Are the people able to buy shares in an industry? (Depends on whether it's privately owned, publicly owned, government owned.)

LESSON (Cont.)

12. Who owns the homes built with timber products?
13. What percentage of a man's wages goes to taxes?

FIXING THE CONCEPT After classroom discussion on all the above information, arrange a debate as to the relative merits of capitalism, socialism, and communism.

INSTRUCTIONAL MATERIALS

BOOKS

Heckman, Harry W.: *The Economics of American Living*

FILMS

Sweden, b/w, 22 min.--McG
What Kind of Government Have We? b/w, 29 min.--McG
Who Goes There--A Primer on Communism, b/w, 54 min.--McG

SUGGESTED SOCIAL STUDIES ACTIVITIES

1. Visits to local historical sites
2. A field trip to a deserted farm
3. Exploring an old cemetery
4. A field trip to historical villages or museums
5. Exploring an old Indian occupational site
6. Exploring an old railroad bed
7. Surveying senior citizens of the community and tape-recording the interview sessions
8. Analysis of a region for human occupancy
9. Attending meetings of community planning and zoning boards
10. Exploring old sites of the early industries of a region
11. Visiting a state or national park
12. Making maps of a community's natural and cultural resources
13. Writing an historical chronology of a community, area, or region
14. Writing letters and articles related to the need for conserving man's natural resources
15. Visiting sites that are polluted

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Scholastic Magazines. What You Should Know About Communism and Why. New York: McGraw-Hill, 1965

PAMPHLETS

American Forests Products Industries, Inc., 1916 N Street, NW, Washington, D. C.

Bureau of Governmental Research and Service, Hellemes 200E, University of Colorado, Boulder, Colorado.

Conservation Foundation, 1250 Connecticut Avenue, Washington, D. C.

Public Affairs Information Service, U.S. Government Printing Office, Washington, D. C.

Public Health Service, Audio-Visual Facility, Atlanta, Georgia.

Tennessee Valley Authority Bulletins, Knoxville, Tennessee.

U.S. Department of Health, Education, and Welfare; Public Health Service; Bureau of Disease Prevention and Environmental Control, Washington, D. C.

U.S. Government Printing Office: Bureau of the Census: Bureau of Indian Affairs; Bureau of Land Management; Bureau of Reclamation; Department of Agriculture; Department of Health, Education, and Welfare; Department of the Interior; Forest Service; National Park Service; Office of Education; Soil Conservation Service. Washington, D. C.

Virginia-Carolina Nuclear Power Plant, Parr Shoals, South Carolina.

Wilderness Society, Washington D. C.

A QUESTION OF SURVIVAL

A Classroom Teaching Unit Featuring The
Concept of Ecology
And The Skills Of
Mode Of Inquiry For The Social Studies

By

Jack Rickard

ASSUMPTIONS

In preparation of this teaching unit the following assumptions have been made:

1. Environmental Education is worth teaching.
2. In teaching about the environment, process should be stressed rather than product.
3. Process skills can most effectively be taught by the inquiry method.
4. An Environmental course should use materials that will help students learn a conceptual scheme from the social sciences, which is essential to a method of inquiry.
5. An Environmental course should present controversial issues that challenge the students values and encourage them to clarify their values and resolve value conflicts in the light of evidence.
6. Students who master the method of inquiry will have a disciplined method of approaching social, economic, and political questions. They will be equipped to learn independently in a world where mankind's knowledge doubles every decade.
7. A student can learn anything at any age if the material is presented on a level of comprehension compatible to his given age level.

In reference to this particular unit it is assumed that:

1. The teacher has access to many types of books and reading materials that the students may use in the classroom for reference, to achieve a well-rounded approach to the current ecological crisis.
2. This unit will be taught to a junior class of Advanced Placement American History.
3. The teacher is familiar with the basic fundamentals of Fenton's Inquiry approach to teaching.
4. The teacher has access to filmstrips such as the Singer Education Series on America's Urban Crisis. Also access to films such as Multiply and Subdue The Earth, and 1985, available from the P.U.H.S. District film library, Project Outreach Resource Center, or many university film rental centers.
5. The class has received some previous instruction on the skills of mode of inquiry.
   During the previous week the class was introduced to the inquiry approach by learning how historians develop hypothesis and how investigators ask analytical questions from social studies concepts, to consider in forming a hypothesis. The class was given selections from Hammurabi's Code and developed hypothesis by use of analytical questions. The class also received a handout prior to the exercise, of concepts and analytical questions for analyzing political systems taken from the Fenton materials.

6. This unit will be taught on the first day of the topic of study, and as the first of a series of units. Other units to be taught will cover the following topics:

Roots of Our Urban Problems
The Air Pollution Menace
Water Pollution
Waste
The Transportation Crisis
The Housing Crisis

MAN AND THE ENVIRONMENT

CONCEPT DEFINITIONS

Ecology: The systems approach to nature, the study of how living organisms and the nonliving environment function together as a whole or ecosystem. The word ecology (derived from the Greek root oikos, meaning "house") is often used in ways that suggest an attitude rather than a discipline. Anthropologists and psychiatrists have adapted it to their work. Ecology is often called the "subversive science". Only 70 years old, it avoids the narrow specialization of other sciences - and thus appeals to generalists, including people with a religious sense.

SUB-CONCEPT DEFINITIONS

Conservation: The careful management and wise use of natural resources to prevent depletion and to maximize the production of wealth from their use. Conservation involves the protection, preservation, and replenishment as well as the planned use of land, forests, wildlife, minerals, and water by private individuals and national, state, and local governments.

Capitalism: An economic system based on private ownership of the means of production and on a supply-demand market economy. Capitalism is based on the laissez-faire theory, which emphasizes the absence of governmental restraints on ownership, production, and trade.

Ecosystem: A vast web of interacting organisms and processes that form the rhythmic cycles and food chains in which ecosystems support one another, such as oceans, coastal estuaries, forests and grasslands.

Police Power: Authority to promote and safeguard the health, morals, safety, and welfare of the people. In the context of the American federal system, police power is reserved to the states. The national government, exercising only delegated powers, does not possess a general police power. Many national laws enacted under the commerce and postal powers, such as those which prohibit shipment of impure drugs in interstate commerce or mailing of obscene literature are, however, examples of what may be termed "federal police power". State laws enacted under the police power may legally invade national jurisdiction if such laws are pertinent to the health, safety, or welfare of the people of the state.

Application to Lesson Plan: The concept definitions will be presented to the students in the form of a handout attached to the handout *Can We Survive Our Polluted Paradise?*, the day before this lesson plan is to be used in class. These concepts have not been discussed in this class before this lesson.

Knowledge Objectives

A. To know that every human activity depends on the integrity and proper functioning of the ecosystem and that pollution of one part of the environment can effect all parts of the environment, however slight the pollution.

B. To know the causes and characteristics of problems of the deteriorating environment.

C. To know that protective of the environment must be a cooperative effort between the people and their government.*

Method of Inquiry Objectives

A. Given analytical questions drawn from social science concepts, to be able to state hypothesis about the relationship of the people, their government, traditional attitudes, technilogical progress, individual rights, to the destruction of the environment.

B. Given analytical questions and data, to be able to state hypothesis about the relationship between the demand for economic and technilogical progress and obstacles for correcting problems of our environment.

C. Given hypothesis about the causes of environmental deterioration, to be able to state generalizations about the results in terms of human and capital resources, quality of the environment, free enterprise system, public health, and standard of living.

Materials

1. Readings to be done by the students outside of class. (Concept definitions and "Can We Survive?") attached, pp. 3, 8-10.
2. Class Handout #1: "Can Law Reclaim Man's Environment?", p.11.

*See page 14 for complete Behavioral Objectives.

Materials (Cont'd)

3. Transparency #1: "Man Victorious Over Nature", p. 12.
4. Class Handout #2: Population Chart, p. 13.
5. Books, handouts, filmstrips and films, for reference in the classroom for the remainder of the time spent on environmental study.

LESSON PLAN

APPROACH

I. Concepts and analytical questions as applied to this unit on Man and the Environment.

A. The students should recognize, from the outside reading assignment, that the problem presented is that of making people aware of what effects modern civilization has upon our natural world and how man fits into the overall ecological pattern of life. They should also understand that they will try to develop hypothesis to explain the reasons for our deteriorating environment.

B. In a class discussion, have the students analyze the problem in terms of the concepts by asking analytical questions.

Examples:

1. Where does responsibility lie for assuring the highest possible quality of life? Has protective of the environment been a cooperative effort between the people and their government?
2. Must efforts to solve the problems of a deteriorating environment result in a slowdown in economic growth and technilogical development?
3. What limits should there be, if any, on government action in the public interest aimed at controlling pollution, overpopulation, and the use of natural resources?
4. What rights do people have to a more livable environment? Should there be a constitutional provision of a right to clean air, clean water, and quiet.
5. How does pollution of one part of the environment affect all parts of the environment, however slight the pollution?
6. Is there a fully effective way to save the environment without eliminating modern technology?
7. How have partial approaches to environmental problems tended to be more successful than "grand designs"?
8. Why is the demand for economic and technilogical progress a chief obstable to correcting the problems of our environment?
9. In dealing with the ecosystem have we passed the point of no return?
10. Why do we say that pollution is an international problem? Would it be a workable idea for the United Nations to outlaw environmental pollution?
11. Do developing nations tend to view environmental problems in the same way that developed nations do?

12. Why should people who live in towns with no industry be concerned with air and water pollution?
13. Why is pollution an important item in local, state, and national budgets?
14. Are ecological problems primarily problems between man and man or man and nature?

After the discussion on the environment the students should be able to generalize that there are many causes for the deteriorating environment. They should realize that the solution to our environment crises involves small measures by many people in accelerating sequence and also by a cooperative effort between the people and their government. They should be able to infer that man is part of an ecosystem that has a delicate balance and that preservation and improvement of our surroundings may require hard personal sacrifices.

II. Discussion of Handout #1

Distribute Handout #1. Allow time for reading. Ask the students what the cases reveal about effective ways to save the environment. Ask the class as a whole to form a hypothesis that relates protective of the environment to efforts between people and their government. They should also establish that pollution of one part of the environment effects all parts of the environment, however slight the pollution. The students may correlate saving the environment with control of modern technology. They may form hypothesis about coming to grips with the problems of our deteriorating environment at the level of the private citizen as opposed to "grand designs" of the government.

III. Discussion of Transparency #1 (cartoon - "Man Victorious over Nature")

Project transparency. Ask the students what they can infer about man's future on the planet Earth from the cartoon. Ask the class as a whole to form a hypothesis to relate the effects modern civilization has upon our natural world and how man fits into the overall ecological pattern of life. The students should infer from the cartoon how much every human activity depends on the integrity and proper functioning of the ecosystem. They may infer in our dealing with the ecosystem we are approaching the point of no return. They should suggest our life styles, our industries, and our population growth are leading to the exhaustion of resources on earth which threatens the continued existence of the human species.

IV. Discussion of Transparency #2 (population growth chart)

Project transparency. Ask the students what the chart reveals about population growth rate of the world. The students should see that if the current population-growth rate continues by the year 2044, the Earth's density will be 1,000 people per sq. mile of earth's arable-urban land. They may infer that the growth of human population of the Earth cannot continue beyond a point. They may also relate the results of population growth and its effects on a country -- to keep living standards, available food, structures, amounts of power, transport systems, doctors, at an adequate level. The students should hypothesize regarding the limits of government action in the public interest.

CAN WE SURVIVE OUR POLLUTED PARADISE?

(Outside Reading)

The environment makes up a huge, enormously complex living machine -- an ecosystem -- and every human activity depends on the integrity and proper functioning of that machine. It is our biological capital, the basic apparatus on which our total productivity depends. If it is destroyed, agriculture and industry will come to naught; yet in the eager search for the benefits of modern science and technology, we have become enticed into a nearly fatal illusion; that we have at last escaped from the dependence of man on the rest of nature. The truth is tragically different. We have become not less dependent on the balance of nature, but more dependent on it. Modern technology has so stressed the living environment at its most vulnerable points that there is little leeway left in the system. We are approaching the point of no return; our survival is at stake.

World population is growing by 70,000,000 people every year. This is the fastest growth in man's history, and the rate is still accelerating. We will number four billion in 1975 and, if current trends continue, we can expect to reach eight billion well before the year 2000. This population is making more and more demands on its environment. We are taking fresh water out of the ground roughly twice as fast as natural processes replace it. The demand for electric power in the U.S. is doubling every ten years, and most power comes from the heavily polluting combustion of coal. We are building 10,000,000 cars a year--twice as many as we made only 17 years ago, and cars burn gasoline, grind rubber tires to dust, wear asbestos brakes into an acrid powder.

A recent scientific analysis of New York City's atmosphere concluded that a New Yorker on the street took into his lungs the equivalent in toxic materials of 38 cigarettes a day. These figures are of vital interest to two-thirds of the population, which is the percentage of Americans who already live in 212 standard metropolitan areas having only 9 per cent of the nation's land area but 99 per cent of its pollution. Some cities out do Manhattan and on days of cloud and atmosphere inversion actually kill off small segments of their excess population (involuntarily, of course).

The automobile is a versatile chemical factory that can produce almost anything you might wish to dial. There is not much evidence that man greatly cares. An automobile properly equipped to get rid of smog effectively would probably be an elaborate mess -- costly, slow, and demanding of much maintenance. Coming into this new knowledge which proves so distressing--that our dearest companion the automobile, is completely incompatible with our health and well-being -- how long will we cling to it in this embrace of death?

How long will man continue to sacrifice his cities, his enjoyment, his life, because of the fetid breath of a monster never built for meandering in city streets with their stops and goes and halting, jammed traffic? An ungainly, unadaptable monster whose 80 mile an hour cruising speed was geared to the long sweep of thruways and not to the bumper-bumper creep among the city's steel canyons? While cars get faster and longer, lives get slower and shorter. While Chrysler competes with Buick for the getaway, cancer competes with emphysema for the layaway. This generation is indeed going to have to choose between humans and the automobile. Perhaps most families have too many of both.

A modern community can destroy its land and still import food, thus possibly destroying ever more distant land without knowing or caring. Technilogical man is so aware of his strength that he is unaware of his weakness - the fact that his pressure upon nature may provoke revenge. Man sometimes triggers a series of dangerous changes. Nature immediately tries to restore the balance and often overreacts. When farmers wipe out one pest with powerful chemicals they may soon find their crops afflicted with six pests that are resistant to the chemicals. Worse, the impact of a pesticide like DDT can be vastly magnified in food chains. Thus DDT kills insect-eating birds that normally control the pests that now destroy the farmers' crop. DDT has been found in the bodies of penquins living on Antarctica.

Modern technology is already pressuring nature with tens of thousands of synthetic substances, many of which almost totally resist decay--thus poisoning man's fellow creatures, to say nothing of himself. The burden includes smog fumes, aluminum cans that do not rust, inorganic plastics that may last for decades, floating oil that can change the thermal reflectivity of oceans, and radioactive wastes whose toxicity lingers for literally hundreds of years. The earth has its own waste-disposal system, but it has limits. The winds that ventilate earth are only six miles high: toxic garbage can kill the tiny organisms that normally clean rivers.

In a biospheric sense, the U.S. bears a heavy responsibility. Each American child is 50 times more of a burden on the environment than each Indian child. Although the U.S. contains only 5.7% of the world's population, it consumes 40% of the world's production of natural resources. The U.S. also produces almost 50% of the world's industrial pollution. Every year, Americans junk seven million cars, each year the U.S. alone paves, over 1,000,000 acres of oxygen-producing trees. Each of California's 18.5 million residents throws away 20 lbs. of solid wastes per day. Most of the garbage is buried in landfills, but space is running out, and there is no state or regional authority to coordinate solutions.

Basic to all solutions is the need for a new way of thinking. So far, the key to so-called progress has been man's ability to focus his energies on a single problem, whether fighting a way or going to the moon. But thinking in compartments is the road to environmental disaster. Americans must view the world in terms of unities rather than units. The biggest need may be a change in values: the whole environmental problem stems from a dedication to infinite growth on a finite planet. Pessimists argue that only a catastrophe can change that attitude--too late. It is also possible that ecologists can eventually stir enough people to an emotion as old as man--exaltation. Ecology, the subversive science, enriches man's perceptions, his vision, his concept of reality. In nature, many may find the model they need to cherish. The question is: How many?

Excerpts from:

Commoner, Barry. "Can We Survive", Issues Today, Vol. 2, No. 14 (March 15, 1970), 6-7.

Rienow, Robert. "38 Cigarettes A Day", The Environmental Handbook. New York: Ballantine Books, Inc., 1970.

"Fighting to Save the Earth From Man," Time, (February 2, 1970), 56-63.

Handout #1: CAN LAW RECLAIM MAN'S ENVIRONMENT?

The U.S. Constitution does not expressly protect the right to breathe clear air, drink clear water, or live free from a steady assault of noise. A growing concern over man's endangered environment has uncovered the lack of legal means to combat the dangers. The following is taken from the first article in a series in The Christian Science Monitor, highlighting discussions at a recent conference on law and the environment.

All across the country these days lawsuits are being filed, lawyers are becoming concerned with environmental problems, and law schools are starting courses and programs in environmental law.

Court actions now draw the most attention. Citizens groups go to the courts as a last resort when legislation, governmental executive decisions, and public opinion have failed to halt actions which they believe are endangering the environment . . .

No clear constitutional basis has developed to aid environmental interests, as in the field of civil rights . . . . and legislation has not caught up with the public demand for environmental protections.

One of the nation's leading trial lawyers in the environmental field, Victor J. Yannacone, Jr., has stated: "Every piece of enlightened social legislation that has come down in the past 50 or 60 years has been preceded by a history of litigation in which lawyers around the country have focused forcibly the attention of the legislature on the inadequacies of existing legislation." In answer to conservationist's calls for a drive to stimulate attention on environmental problems through use of the courts as well as the legislatures, the first Conference on Law and the Environment was held recently in Warrenton, Virginia . . . .

Some of the lawyers present felt the courts were the most responsive forums to resolve social conflicts. Others felt there were dangers in asking courts to do what legislatures are conceived to do . . . .

Compared to his adversary (often big business or big government), the citizen plaintiff . . . has the short end of the stick with regard to funds to carry on a case . . . information sources . . . expert witnesses, and a background of substantive law . . . .

Most important, as plaintiffs, the environmentalists must bear the burden of proof, that a proposed new development will be ecologically or aesthetically damaging.

"BEST COPY AVAILABLE"

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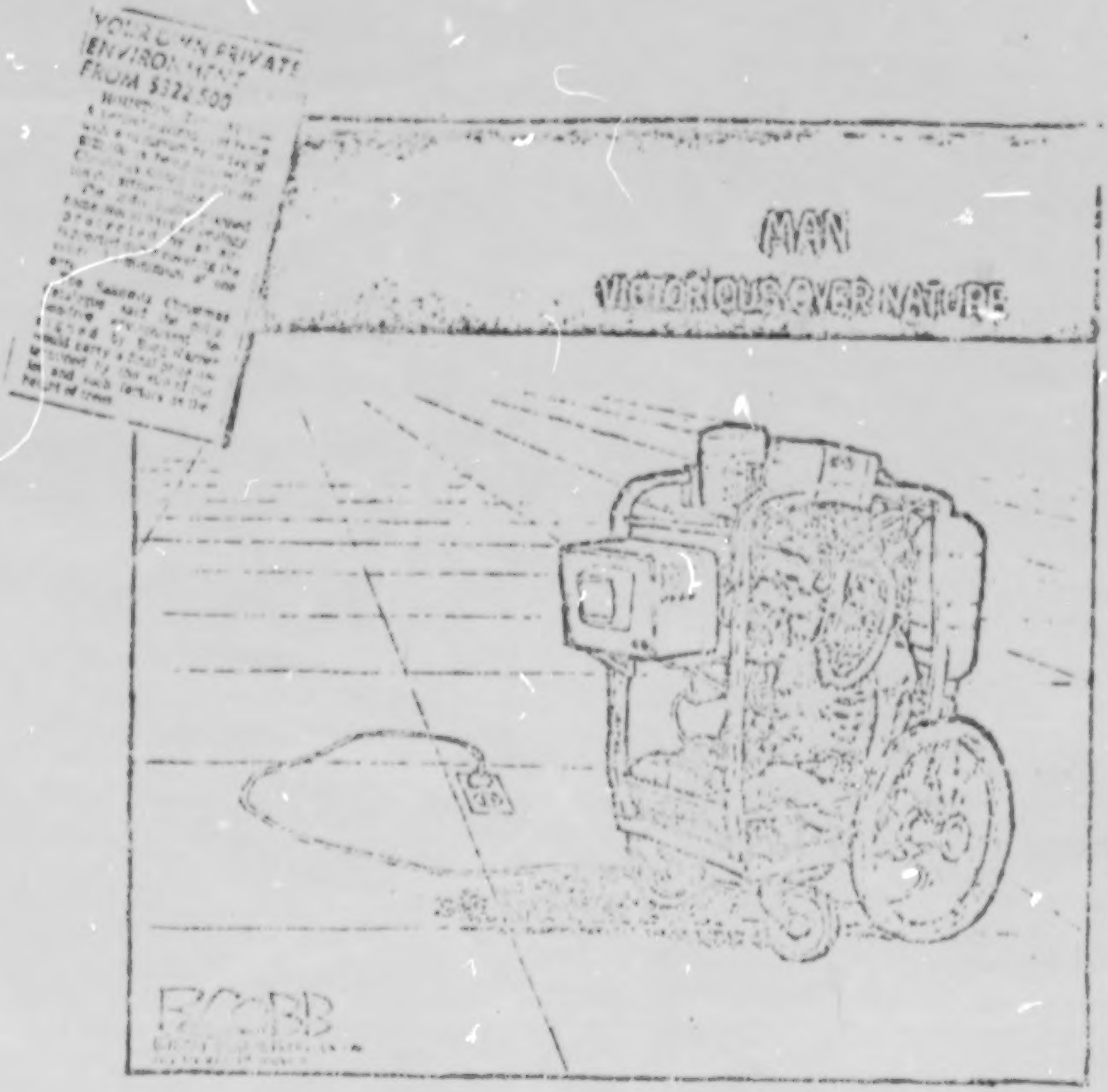
YOUR OWN PRIVATE ENVIRONMENT FROM $322,500
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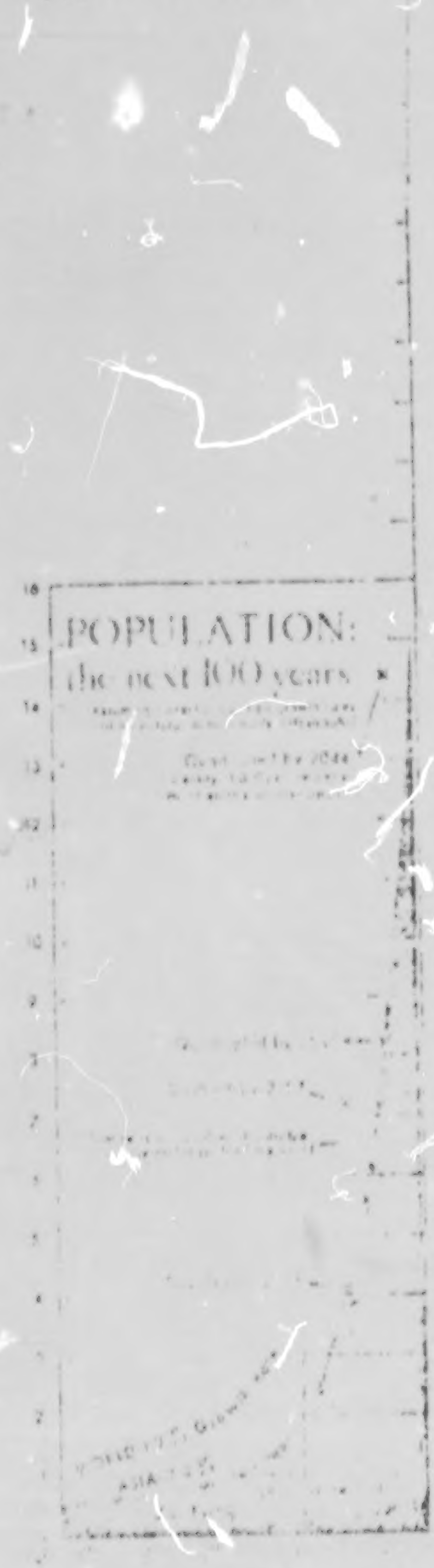

BEHAVIORAL OBJECTIVES

KNOWLEDGE OBJECTIVES

A. In a classroom test situation of a twenty minute time period, without reference to notes or other aids, the student will be able to list and briefly describe the factors that contribute to the destruction of the environment. The criteria for achieving this objective will be 100% accuracy in listing the factors previously covered in the teaching unit. The teacher should be able to recognize all elements of a strong, specific definition in order to make a value judgment of accuracy. Among those listed should include industrial wastes, human waste, pesticides, chemical wastes, air traffic, highway planning, exploitation of natural resources, distruction of wildlife, urban planning and population growth.

METHOD OF INQUIRY OBJECTIVES

A. In a classroom situation of a fifty minute period, given data about the destruction of the environment, each student will be able to develop a number of hypothesis about the effects modern civilization has upon our natural world and how man fits into the overall ecological pattern of life which accurately indicate the individual student's ability to use the steps of mode of inquiry. The student demonstrates by raising his hand or giving other cues that he is willing to participate and can give clear hypothesis about the reasons for the environmental destruction. Accuracy must be determined by the teacher upon completion of the teaching unit and the teacher will make a value judgment based on how closely the student's hypothesis corresponds with those that the teacher has included in this teaching unit.

B. In a classroom situation of a fifty minute period, the student will demonstrate his ability to carry on an independent investigation. Given data on forms of an environmental problem, he can write without assistance, a passing paper which involves the development and validation of a hypothesis using materials provided by the teacher from the school library. Accuracy will be determined by how closely the student has evaluated the hypothesis in the light of the data and how accurately his data supports the hypothesis. He must demonstrate complete accuracy in all steps of the mode of inquiry, this to be evaluated by the teacher.

ATTITUDES AND VALUES

A. In a classroom situation of a fifty minute period, the student will defend his opinions on reasons for environmental deterioration, and propose workable alternatives to our present pattern of living, with factual evidence rather than with appeals to authority, superstition, or some other similar source. This will be assessed best by observing student response and by analyzing classroom dialogue transcribed from a tape recording. This assessment must be a subjective value judgment on the part of the teacher based on the standards and factual information the teacher has access to, or has included as a part of this teaching unit.

PERSPECTIVES

By Claudia Lane

Abstract

Environment and ecology are an integral part of the social sciences, the natural sciences, and the health sciences. It is an area that lends itself very well to classroom discussion; students are willing and interested in this area. I have found that a useful device for stimulating discussion on various aspects of ecology and environment is the use of provocative articles and excerpts by current workers in the field. These discussions can be handled on an entire class basis, within several smaller discussion groups, or on an individual basis. The students then usually prepare a written analysis of their reaction to the discussion and the articles, partially in response to some questions on the selections that I pose to them. I have reproduced some of these selections in this paper along with some of the questions I use and some of the sources that I use.

Inescapable Materialism - The Panchatantra (4th Cent. A.D.)

Until a mortal's belly-pot
Is full, he does not care a jot
For love, or music, wit or shame,
For body's care or scholar's name,
For virtue or for social charm,
For lightness or release from harm,
For godlike wisdom, youthful beauty,
For purity or anxious duty.

1. What are man's basic needs?

2. What would you consider some of modern-day American "needs" that are really unessential in other less-developed countries? List a few.

3. If you were hungry, naked and homeless, how much would you worry about a color TV, dates, new friends, getting to the latest Cactus concert?

4. Granted that most civilized (and I use the word loosely) countries are materialistic, is this a learned response? Are we culturally conditioned to want a nice home, car, clothes, etc.?

5. Are most young people, especially those who think themselves part of the Now Consciousness, still as materialistic as the rest of the world that they are putting down? As an example, everyone has to have certain possessions to be accepted in the group - VW bus, properly faded bell jeans, homespun-looking shirts, buffalo sandals, long hair, zigzags, etc. Is this too severe a statement?

A Prerequisite for Sensitivity - Willard L. Sperry (1950)

The climbers on Everest were occasionally asked what the landscape looked like as seen from the upper slopes of the mountain. They uniformly replied that they had no margins of attention to spare for sightseeing. At an altitude where three breaths were required for every step upward they had to devote their minds to the single all-absorbing problem of where next to put a foot. The aviator who finally flew over the summit of Everest was able from the cockpit of his plane to photograph the top of the mountain below him and the outspread panorama round about him.

1. Is the message in this story really about Mt. Everest?

2. What is a requirement to be sensitive to a problem?

3. Can you relate this story to the following quotes:
   a. "I'm too close to the problem to grasp it."
   b. "You can't see the forest for the trees."

4. Can you relate this passage to the attitudes of many Americans (including yourself, possibly) that what goes on in the rest of the world is not really important or worth caring about in the long run?

Wilderness and the Camel's Nose - Raymond B. Cowles (1960)

The demand for invasion of wilderness-sanctuary areas for water storage and power dams, oil rights, iron ore, irrigation, forests, farm lands, and so on is now but a gentle movement in comparison to what it will be with our predicted population of even forty years hence.

It is not difficult to multiply examples: you have the pressures for lake fronts, stream sides, beach frontage, mountain property, anywhere there is beauty. These resources are as ample as they ever were, but not in terms of our present population size. It isn't that we have used up or consumed some of these things, but that we have simply outgrown them in terms of numbers relative to available areas.

As I see it, the stages that accompany the growth of population and density will take approximately the following steps: First, we see the need for wilderness areas; for their beauty, their peace, their scientific value. We restrict the wilderness areas to foot travel or horse travelers, but their numbers will increase along the trails until one is never out of sight or sound of others. Then there will be added more trails in order to dilute the density of the hikers on the trails; and we will probably have pack burros and horses increasingly to get to more remote areas and allow people to escape to the very thing for which wildlife and wilderness areas were established - solitude. So we will crowd, then develop more trails in more and more remote areas. Following this, there will be pressure for access roads - for fire protection, chiefly, or for those that don't have the hardihood to do it on their own feet or on horseback to traverse and merely see unspoiled nature. Then there will be requests for fixed campsites to localize the damage from an excess of people in the area. Then there will be demands for other campsites within the area so that more people can linger and enjoy the wilderness. A store, then stores, to supply food for more campers. This is supposed to be a prediction, but I've seen it happening already. These stores will spread through the area to supply more food for more campers. Then we will see demands rising for the establishment of inns, as they will be called, but they will be hotels, and then more of these inns or hotels, in order to supply comfort for the people who are not rugged enough to take the wilderness by themselves. Then there will be the demand for amusements associated with these inns and resting places to beguile the people who are bored during the hours of evening and night when they can't see anything. This will be repeated and there will be an insidious multiplication of these types of accommodations to take care of ever more people. And there will be more roads to give more fire protection, more accommodations, and to dilute the harmful effects of local pressures we will have a spreading web of roads, until there is no genuine wilderness left. Then there will be a frank conversion of these accommodations to resort use. Ultimately - because we no longer have a wilderness - subdivision could logically follow. Who cares beyond that?

Wilderness (Cont'd)

1. Does the progression outlined by the author make any sense?

2. When you have more and more people wanting to use recreational areas, does this force more control and regimentation? List 5 examples.

3. Give 2 examples of man's encroachment (destruction) on the environment and wilderness in Arizona.

The Ethical Dilemma of Science - A.V. Hill (1952)

The dilemma is this. All the impulses of decent humanity, all the dictates of religion and all the traditions of medicine insist that suffering should be relieved, curable diseases cured, preventable diseases prevented. The obligation is regarded as unconditional; it is not permitted to argue that the suffering is due to folly, that the children are not wanted, that the patient's family would be happier if he died. All that may be so; but to accept it as a guide to action would lead to a degradation of standards of humanity by which civilization would be permanently and indefinitely poorer . . .

Some might take the purely biological view that if men will breed like rabbits, they must be allowed to die like rabbits . . . Most people would still say no. But suppose it were certain now that the pressure of increasing population, uncontrolled by disease, would lead not only to widespread exhaustion of the soil and other capital resources but also to continuing and increasing international tension and disorder, making it hard for civiliation itself to survive: Would the majority of humane and reasonable people then change their minds? If ethical principles deny our right to do evil in order that good may come, are we justified in doing good when the foreseeable consequence is evil?

1. What is the author talking about in the first paragraph? Do you agree or disagree with him?

2. With reference to the last sentence, what is the author talking about?
    a. ethical principles denying us the right to do evil (letting old and ill people die instead of trying everything to keep them alive) in order that something good might come of it (no suffering).
    b. What does he consider doing good (refer to the population problem and possible solutions) when some might consider the consequences evil?

3. If it came to a choice of limiting population or living under unbearable conditions for you and your children (don't forget - they're going to be around long after you are), what choice would you make? Would you rather have as many children as you wanted under increasingly crowded conditions (schools, housing, recreational areas) or would you rather have fewer children and a more enjoyable life for all concerned?

Be Fruitful and Multiply - The Bible

And God said, "Let us make man in our image, after our likeness: and let them have dominion over the fish of the sea, and over the fowl of the air, and over the cattle, and over the earth, and over every creeping thing that creepeth upon the earth."

So God created man in his own image, in the image of God created he him; and male and female created he them.

And God blessed them, and God said unto them, "Be fruitful and multiply, and replenish the earth, and subdue it; and have dominion over the fish of the sea, and over the fowl of the air, and over every living thing that moveth upon the earth."

1. Forgetting for a moment that this is the Bible, does man have the right to subdue all living creatures to his will?

2. Can man control his environment OR should man recognize that he is but a part of the environment and not damage natural ecosystems?

3. If I re-titled this "Be fruitful, and don't multiply," how could not multiplying make life more fruitful? How would you re-write this passage in this frame of mind?

On Woman's Place in Nature - Rev. William John Know Little (1880)

God made himself to be born of a woman to santify the virtue of endurance; loving submission is an attribute of a woman; men are logical, but women, lacking this quality, have an intricacy of thought. There are those who think women can be taught logic; this is a mistake. They can never by any power of education arrive at the same mental status as that enjoyed by men, but they have a quickness of apprehension, which is usually called leaping at conclusions, that is astonishing. There then, we have distinctive traits of a woman; namely, endurance, loving submission, and quickness of apprehension. Wifehood is a crowning glory of a woman. In it she is bound for all time. To her husband she owes the duty of unqualified obedience. There is no crime which a man can commit which justifies his wife in leaving him or applying for that monstrous thing, divorce. It is her duty to subject herself to him always, and no crime that he can commit can justify her lack of obedience. If he be a bad or wicked man, she may gently remonstrate with him, but refuse him never. Let divorce be anathema; curse it; curse this accursed thing, divorce; curse it, curse it. Think of the blessedness of having children. I am the father of many children and there have been those who have ventured to pity me. "Keep your pity for yourself," I have replied, "they never cost me a single pang." In this matter, let women exercise that endurance and loving submission which, with intricacy of thought, are their only characteristics.

1. This was written in 1880, but does it still exist basically as most people's idea of a woman's role in society?

2. Do you think we could change society's idea of the family as the basic societal unit? In other words, aren't most of us brought up towards the ideal of father, mother, children, happy home?

3. Are communes and commune life an extension of this idea or do they reflect different ideas about family importance?

4. Can you define the role of the male in society? What is it? Is it exclusively a male's role?

5. Can you define the role of the female in society? What is it? Is it exclusively a female's role?

The Road Not Taken - Robert Frost (1916)

Two roads diverged in a yellow wood,
And sorry I could not travel both
And be one traveler, long I stood
And looked down one as far as I could
To where it bent in the undergrowth;

Then took the other, just as fair,
And having perhaps the better claim,
Because it was grassy and wanted wear;
Though as for that the passing there
Had worn them really about the same,

And both that morning equally lay
In leaves no step trodden black.
Oh, I kept the first for another day.
Yet knowing how way leads on to way,
I doubted if I should ever come back.

I shall be telling this with a sigh
Somewhere ages and ages hence
Two roads diverged in a wood, and I -
I took the one less traveled by,
And that had made all the difference.

1. Interpret this in any way you feel.
2. Can you see any relation to James Taylor's "Country Road?"

How To Save the Ship - Paul Ehrlich (1968)

A ship has hit the rocks and is sinking. The passengers scream for help. Some jump overboard and are devoured by the circling sharks. A group of distinguished scientists is on board. One of their number suggests that they can help man the pumps. "Oh, no," shout the others. "That might hurt the captain's feelings. Besides, pumping is not our business. It's outside our field of competence." You can guess what they do. They appoint a committee to study the problem, with subcommittees on marine engineering and navigation. They announce to the passengers that in two or three years the committee will produce a wonderful report which will be acceptable to the passengers, the captain, and the steamship line. Not so passive are the politicians. Some jump up to say that the passengers don't understand the political realities of the situation. Other more progressive politicians grab thimbles and start bailing, stopping every few seconds to accept praise for their valiant efforts.

That about sums up the situation on the population control front in the United States and in much of the rest of the world.

1. Is this last sentence true? What can you see that is being done anywhere in the world that has any effectiveness?
2. Governor Williams, in a brilliant display of ignorance and stupidity stated that, "the United States is not overpopulated and that even if it were, Arizona has enough land area to accommodate the entire U.S. population." Assuming that his statement is true, would you want all the U.S. population in Arizona? Why or why not?
3. Does overpopulation necessarily mean that every square inch of land is filled with people? How can you define "overpopulation"?
4. Does "quality of life" mean anything in a discussion of overpopulation. If so, what and why?

The Life and Times of Archy and Mehitabel - Don Marquis (1930)

"dear boss i was talking with an ant the other day and he handed me a lot of gossip which ants the world around are chewing among themselves

"i pass it on to you in the hope that you may relay it to other human beings and hurt their feelings with it

"no insect likes human beings and if you think you can see why the only reason i tolerate you is because you seem less human to me than most of them

"here is what they are saying

"it wont be long now it wont be long man is making deserts on the earth it wont be long now before man will have used it up so that nothing but ants and centipedes and scorpions can find a living on it

"man has oppressed us for a million years but he goes on steadily cutting the ground from under his own feet making deserts deserts deserts

"we ants remember and have it all recorded in our tribal lore when gobi was a paradise swarming with men and rich in human prosperity it is a desert now and the home of scorpians ants and centipedes

"what man calls civilization always results in deserts man is never on the square he uses up the fat and greenery of the earth each generation wastes a little more of the future with greed and lust for riches

"north africa was once a garden spot and then came carthage and rome and despoiled the storehouse and now you have sahara sahara ants and centipedes

"toltecs and aztecs had a mighty civilization on this continent but they robbed the soil and wasted nature and now you have deserts scorpions ants and centipedes and the deserts of the near east followed egypt and babylon and assyria and persia and rome and the turk the ant is the inheritor of the tamerlane and the scorpion succeeds the caesars

"america was once a paradise of timberland and stream but it is dying because of the greed and money lust of a thousand little kings who slashed the timber all to hell and would not be controlled and changed the climate and stole the rainfall from posterity and it wont be long no it wont be long till everything is a desert from the alleghenies to the rockies the deserts are coming the deserts are spreading the springs and streams are drying up one day the mississippi itself will be a bed of sand ants and scorpions and centipedes shall inherit the earth

The Life and Times of Archy and Mehitabel (Cont'd)

"men talk of money and industry of hard times and recoveries of finance and economics but the ants wait and the scorpions wait for while men talk they are making deserts all the time getting the world ready for the conquering ant drought and erosion and desert because man cannot learn

"rainfall passing off in flood and freshet and carrying good soil with it because there are no longer forests to withhold the water in the billion meticulations of the roots

"it wont be long now it wont be long till earth is barren as the moon and sapless as a mumbled bone

"dear boss I relay this information without any fear that humanity will take warning and reform signed archy"

1. Are some deserts man-made?
2. Give several examples of how man is destroying the earth.
3. If there were people this aware around in the first part of this century, why hasn't there been much done?

Pollution - Tom Lehrer (1965)

If you visit American city
You will find it very pretty.
Just two things of which you must beware:
Don't drink the water and don't breathe the air.

    Pollution, pollution they got
    Smog and sewage and mud;
    Turn on your tap and get
    Hot and cold running crud.

See the halibuts and sturgeons
Being wiped out by detergents.
Fish gotta swim and birds gotta fly -
But they don't last long if they try.

    Pollution, pollution, you can
    Use the latest toothpaste,
    And then rinse your mouth
    With industrial waste.

Just go out for a breath of air
And you'll be ready for medicare.
The city streets are really quite a thrill:
If the hoods don't get you, the monoxide will.

    Pollution, pollution, wear
    A gasmask and a veil;
    Then you can breathe,
    Long as you don't inhale.

Lots of things there that you can drink,
But stay away from the kitchen sink;
The breakfast garbage that you throw into the Bay,
They drink at lunch in San Jose.

    Pollution, pollution, see the crazy people there,
    Like lambs to the slaughter,
    They're drinking the water
    And breathing the air.

Plant a Live Christmas Tree

Each year millions of pine trees are cut down (killed) to provide festive decoration for the holiday that celebrates the birth of Christ. The yearly quest for the perfect Christmas tree usually produces a less-than-perfect specimen, chopped down several weeks earlier in the north country and ready to drop its needles and become a fire hazard in short order.

There is an attractive alternative to dead Christmas trees. A modest-sized pine can be bought live and kept for several years in a tub of sufficient size. You should consult with a local nursery about the proper choice and care. Each year it can be brought indoors for a week or two during the Christmas season, and when it grows too large, it can be planted on one's own property or donated to the municipal parks department.

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THE WEB OF LIFE

by

Mack Stanley

ABSTRACT

The population of our environment is a reality. There is no problem seeing evidence of this calamity. Concerning people of the dangers, however, presents an enormous problem. Many approaches must be used, both subtle and obvious.

After reading the book, *The Web of Life* by John H. Storer, I was struck by how simple and easy to understand the author made the most basic of life's story. It occured to me that most students received some sort of instruction in this subject during their school careers, but it was probably in a formal lecture-study-quiz atmosphere and quickly forgotten. Reawakening or awakening, as the case might be, young people's concern for their environment by exposing them to the basic facts of nature certainly seemed in order. The plan, then, was to provide an opportunity for them to gather information from *The Web of Life* in an informal setting with each proceeding at his own speed. Let them teach themselves and each other about this problem of utmost importance. To this end, I propose the following UNIPAC classroom approach.

Abstract (Cont'd)

I. Statement of major idea, skill or attitude

A. Environmental control will come only after sufficient numbers of people become concerned so they will pressure governments on all levels to take action.

B. Component ideas, skills, or attitudes to be covered:

1. How life began

2. Relationship of geography to life

3. Food Chains

4. Laws of life

5. Man in the environment

6. Action that can be taken

II. Behavior Objectives

A. What is the relationship between the soil of the earth and rocks?

B. Describe in your own words how the land gets fresh water.

C. Just how important is topsoil? Explain.

D. Explain with an example the following statement:
The environment that supports life extends far beyond the vision or experience of the things that live there.

E. In nature, what are the laws of life? Explain each.

F. What is meant by the phrase, "carrying capacity of the land"?

G. What are the four basic raw materials upon which all life rests?

H. Can man use the natural resources of the world for his benefit without destroying them? Why or why not do you think so?

Abstract (Cont'd)

I. On the basis of what you have learned, what specific responsibility are you willing to assume that will contribute in some manner to a cleaner environment?

III. Materials

A. A classroom set (40 copies) of the book: The Web of Life by John H. Storer

IV. Plans

A. The UNIPAC is designed to be used in the senior high school and covered in 5-7 class periods.

B. Distribution of materials and explanations are made during the first day.

C. Students can read the text at their own speed throughout the alloted periods, either in or out of class.

D. Opportunity for small group discussions should be provided each day after the initial day. More interested and/or gifted students could serve as discussion leaders. Participation in such discussions are strictly optional.

E. Those not wishing to participate in daily discussions could do the following:

1. Read the text during class time

2. Formulate a test for succeeding classes to measure learning. The test, when completed, would be self-administered at the beginning of the unit and likewise at the end. Each student would grade his own test and would be the only one to know what, if any, learning took place.

3. Find and write-out the behavior objectives.

4. Prepare bulletin board displays concerning the subject.

5. Research related topics in the school library.

F. The teacher's role should be one of low profile. The point of presenting the subject in this manner is to give the student the impression that it is not just another dreary assignment he must complete and hand-in.

G. No papers are to be collected or grades given. Place the responsibility of learning on the students. If they choose not to learn, force will be of little use. Expose and hope is the procedure. If correcting action is ever to occur, each person's concern for the environment must be built on solid ground with information he has discovered.

H. Any of the following films could also be utilized during the unit. They are available through PROJECT OUTREACH ENVIRONMENT EDUCATION RESOURCE CENTER.

1. Ark 16mm/20 min./color
   Arthur Barr Productions, Inc.

2. The Chain of Life 16mm/30 min./color
   Nat. Educ. Television

3. Life in a Vacant Lot 16mm/10 min./color
   Ency. Brit. Educ. Corp.

4. Life in Parched Lands 16mm/30 min./color
   McGraw-Hill Films

5. The Mountains 16mm/14 min./color
   Arthur Barr Productions, Inc.

6. Our Vanishing Lands 16mm/24 min./color
   McGraw-Hill Films

7. Silent Spring of Rachel Carson, Parts I - II
   16mm/54 min./b and w
   McGraw-Hill Films

8. A Strand Breaks 16mm/17 min./color
   Ency. Brit. Educ. Corp.

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AIR POLLUTION

by

Eleanor Davey

AIR POLLUTION

ABSTRACT

Pure air is everyones business. In this paper I have covered the pollutants and their sources. What polluted air is doing to humans, animals and vegetation.

The increase in respiratory diseases, especially EMPHYSEMA which nearly 50,000 Americans die from annually and BRONCHITIS, affects 1 out of every 5 persons.

Included is information on what cities, states and federal governments are trying to do to control the problem.

PART 11

Part 11 includes Laboratory Experiments for students to do and become acquainted with what they can do to help.

This unit could take one to three weeks, with short periods later to check on long time experiments.

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INTRODUCTION

Man, the superior organism, has been able through the centuries to improve his environment. Homes and all buildings have been made comfortable with air conditioning and heating. This comfort, as well as hundreds of others, have been brought about through technology and industry.

All of these improvements have, in one way or another, contributed to our deterioration of the environment upon which man must depend for life.

The most ominous and pervasive threat to environmental quality and human health is air pollution. The ambient, or all encompassing air that we breathe, respects no boundaries. It rides the winds or becomes over burdened with noxious gases when not dispersed by weather changes, so we have to take it as it comes. Once the air is polluted, unlike dirty water, it cannot be purified unless, of course, it is to be contained in a sealed space. Some harmful contents are scrubbed out by rainfall, most remain suspended about us producing long term effects that we wish we knew more about. What we do know is terribly upsetting. For example, a nonsmoker walking the street of New York to and from work during meal hours will probably breathe into his system carcinogenic pollutants more than equal to a pack of cigarettes. He has no choice. When air pollution is perceptible it must be assumed that also present in the air are all kinds of invisible poisonous gases -- such as carbon monoxide that makes up 90% of the health-endangering pollutants.

Today, however, it is not only the air over our cities that is polluted, but the entire atmosphere of our planet is now afflicted to some degree.

Unless we can overcome air pollution, the problems of water, land, over population and other pollutions will be unimportant because man can not live without air.

In 1966 the United States Health Office, in a public opinion poll, labeled Air Pollution the number one threat to equality of the environment and human health.

The 1968 UNESCO Conference concluded that man had only twenty more years before the planet stated to become uninhabitable because of pollution.

In December of 1969 the results of a Gallup Poll showed that more than 85% of the population of the United States was concerned about the problems of environmental pollution. The same poll disclosed that 3 out of 4 persons questioned said that they would be willing to pay additional taxes to improve the nation's physical surroundings.

Since that time the President of the United States has called for a broad program of environmental legislation and has emphasized the need to protect and enhance the quality of our environment.

Arizona is in many ways more fortunate than other areas of the United States in that our present environment is certainly less damaged than elsewhere. Nevertheless, with its rapidly expanding economy and increasing population, Arizona is now experiencing many environmental problems.

AIR POLLUTION

The form of pollution that most of us are aware of is "Air Pollution."

Air Pollution is defined as: Contamination of the air by waste products of the activities of man.[1]

If we live near cities we can see it, and we can feel it when it burns our eyes or irritates our lungs. Virtually every major metropolis of the world has serious air pollution problems.

Your community's air is polluted when the contamination is strong enough to affect you. To interfere with your comfort, safety, or health or to prevent you from using and enjoying your property and your community.

First we must understand the composition of clean air. The air surrounding the earth is a mixture of several gases. These gases are invisible, odorless and tasteless. About one fifth of the air is oxygen and almost four fifths of it is nitrogen. The average proportion of each is respectively 20.9 per cent oxygen and 78.0 per cent nitrogen. Thus, two common gases make up almost 99 per cent of the air. Nearly 1 per cent of the air is composed of the gas argon. Carbon dioxide forms only three or four one hundredths of one per (0.03 -- 0.04%) of the air. The remainder consists of slight traces of helium, neon, kripton, and xenon. In addition to the above gases, air contains variable amounts of water vapor, and solid particles such as dust, pollen grains, and spores produced by plants. Water vapor and these other impurities are found in greatest quantities in the air nearest the earth's surface.

Latitude, excess moisture, altitude and temperature may cause slight variations in the composition of the air.

Argon, helium, neon, kripton and xenon are known as rare gases because of their great scarcity. Of all the elements, these gases are the most difficult to identify because they have no chemical properties. Chemists call them inert elements because they will not combine with other elements. Helium is used in balloons and dirigibles instead of hydrogen. Although it is twice as heavy as hydrogen, helium does not burn so it is much safer to use. Argon is used in some electric lamps and neon is used, of course, in the familiar neon signs.

THE MAIN AIR POLLUTANTS:

SULFUR DIOXIDE is a product of the combustion of sulfur-bearing fossil fuels such as coal and oil. Electric utilities contributed nearly half of the 33 million tons in 1968. The other large contributors were large industries, heating furnaces, cars and garbage incinerators.

CARBON MONOXIDE is odorless and tasteless gas. The car contributes over 60 million of the annual 100 million tons.

HYDROCARBONS enter the atmosphere as a result of incomplete combustion. Industrial processes account for a substantial portion of these gases, the automobile provides more than half of all the hydrocarbons in the air we breathe. The hydrocarbon produced annually is over 32 million tons.

ASBESTOS is a pollutant which enters the air with the wearing away of brake linings and clutch facings, and from building materials.

OXIDES OF NITROGEN are one of the major automobile emissions that help produce photochemical smog. Cars contribute just less than half of the 20 million tons annually. Electric utilities, metal fabricating, and chemical plants are the other big sources. Oxides of nitrogen become nitrogen dioxide which in turn, after absorbing the sun's ultraviolet rays, becomes nitric oxide and atomic oxygen. Interacting with hydrocarbons these oxides of nitrogen produce photochemical smog and a by product poison, ozone.

POLLUTANTS (Cont'd)

PARTICULATES are a classification of the particles of soot, fly ash, the fallout from all kinds of industrial activity, and the unburned specks that pour out of smokestacks and incinerators and appear every time a fire is lit in a dump, field, woods, or backyard. New York's particulate dustfall is tremendous, 70 thousand tons in 1969 and in some areas up to 30 tons per square mile per month.

The slight decrease in the earth's temperature since 1940 is laid to the build up of particulates that hang over human settlements like fog banks. Not only does this blanket keep out some sunlight, but dust particles help to form clouds and start rains by attracting water vapors.

LEAD particles that flake off walls that still bear lead based paints. (now outlawed) The major contributor of lead is the car.

BERYLIUM which is used in making metal alloys.

TOXIC HYDROGEN FLOURIDE is the exhaust from rockets.

FLOURIDES FROM PHOSPHATE main source from fertilizers.

PESTICIDES become airborne at least briefly when they are applied by spraying. Droplets from coarse spray jets travel through the air at high speed and either hit the target or fall to the ground rapidly. Smaller droplets remain air borne for longer time. Fumigants may be applied as a true vapor and remain airborne indefinitely or until they either decompose or are absorbed on some other material. Pesticides are oxidized more rapidly in air than in water or soil, because in relation to their mass, more of their surface area is exposed to oxygen.

RADIOACTIVE products not only affect the air, but the soil, and both fresh and salt water. The source of this pollution is to be found in atomic explosions. Following the formation of the atomic mushroom, a large quantity of gas and radioactive solids are liberated. These particles are carried away by winds and their fallout can contaminate large surfaces. The larger particles remain along a rather narrow strip determined by whatever way winds are blowing. The smallest particles may travel around the earth several times before dropping at some indeterminated point.

AIR POLLUTION AS RELATED TO HEALTH PROBLEMS:

Air is essential to human life, man must breathe it continually to survive. Man needs air to provide OXYGEN for his bloodstream to carry out the metabolic processes essential to keep him alive - - - converting the air to CARBON DIOXIDE (CO_2) when it is exhaled.

The normal adult inhales some 15,000 quarts of air daily, about 10 times as much by weight as what he eats and drinks in the same period. Animals, along with plants and humans, are susceptible to bad air. A factory in the state of Washington was held responsible for the death of all but 100 of a herd of 2,000 cattle through air pollution.

One question of ecological concern is the biochemical cycles of oxygen, sulfur, carbon and nitrogen. All organisms build their protein basically from those four elements and hydrogen. If man were to destroy any of at least a half a dozen types of bacteria involved in the nitrogen cycle, say, life on earth could end.

In the United States we pollute our air with nearly 200,000,000 tons of "AERIAL GARBAGE" each year.

CARBON MONOXIDE is the gas that can pass without warning, unnoticed into the blood system. It combines with hemoglobin to impede the transportation of oxygen from the lungs to the body tissues. Such deprivation of oxygen slows down reactions, produces nausea and dizziness, blurs visual acuity, and affects the brain generally. It is clear that many traffic accidents along congested highways are due to the crippling of driver responses by CARBON MONOXIDE.

PROBLEMS (Cont'd)

HYDROCARBONS are the emissions that, along with oxides of nitrogen, produced the first smog over Los Angeles. At the time the entire United States had 30 million automobiles, today we have 90 million. Smog irritates one's eyes and throat, reduces visibility seriously enough to become a safety hazard around every airport. Gaseous HYDROCARBONS have been definitely identified as containing carcinogenic (cancer-producing) agents.

BENZO-A-PYRENE is the HYDROCARBON most clearly associated with cancer. It is present in cigarette smoke, and a one-pack-a-day man inhales about three micrograms daily. A non-smoker in a highly polluted area takes in more BENZO-A-PYRENE daily than he would from a pack of cigarettes. The concentration of this pollutant is fifty million times greater in cities like New York, Chicago or Los Angeles than in Grand Canyon National Park.

A sixty-two year study of mammal and bird deaths at the Philadelphia Zoo revealed there had been a six-fold increase in lung cancer deaths among nine families of mammals and five families of birds. Alexander P. Seversky, an aeronautical designer, compared the dangers of lung cancer producing automobile exhausts to cigarette smoking. The Philadelphia Zoo is bounded on one side by the Schuylkill Expressway and on the other by busy Girard Avenue.

ASPHALT, the common road material, contains many cancer-producing chemicals. Particles worn away from roads by car tires, settle quickly and are not inhaled, however, particles blow to nearby farm crops and enter the body through food.

The remarkable material known as ASBESTOS can be a cause of lung cancer. A study of persons whose occupation subjected them to moderate amounts of ASBESTOS showed a marked increase in lung cancer over the expected in the general population. Cancers of the colon, rectum and stomach occurred three times more often than expected normally. Also, the very rare form of lung cancer which occurs in the outerlining (mesothelioma) occurred in 20% of the men studied. In the general population of three of New York's city hospitals, nearly half of all lung tissue samples showed asbestos bodies.[2]

LEAD in the air at certain levels kills. In poorer sections of town children die or suffer brain damage quite regularly from inhaling LEAD particles. Doctors have proven that the human body retains the same percentage of lead traces as are found in the immediate environment.

BERYLIUM causes a debilitating form of lung infection.

SULFUR DIOXIDE is the pollutant associated with the big disasters in London, New York and Belgium. Evidence indicates that people exposed to it from birth suffer more than those that are not. It is known to aggravate respiratory diseases such as emphysema and bronchitis. Aside from what it does to your health it is a major destroyer of property, particularly in the form of corrosive sulfuric acid mist. In West Virginia an Electric Power Company plant has virtually wiped out commercial Christmas tree plots in nearby Maryland. Evidence indicates that small particulates carry SULFUR DIOXIDE, DDT and other harmful agents into our respiratory passages. See Figure 1 - the human respiratory system.

EMPHYSEMA is the fastest growing cause of death in the United States. EMPHYSEMA and BRONCHITIS diseases results in changes in the elastic properties of the lung. Smog and sulfur dioxide aggravate EMPHYSEMA AND increase the severity of the disease. Emphysema is an enlargement of the alveoli, where oxygen exchange between air and blood takes place. This condition may cause a large part of the air space in the lung to become "dead" resulting in infection or an added load on the heart. See Figure 2 (air sacs affected by emphysema).

Excessive secretions of mucus, to the point that it interferes with breathing is characteristic of the disease known as BRONCHITIS. If mucus is secreted faster than it can be removed, the passageway is obliterated and the whole section of lung behind the plug will be unavailable for gas exchange. Without ventilation that section of the lung will collapse in a short time.

Why is clean air [illegible]

Figure 2

PROBLEMS (Cont'd)

PESTICIDES by definition are toxic to the target organisms and, usually, they are toxic in some degree to non-target organisms as well. The hazard to non-target organisms depends partly on the nature of the exposure, such as inhalation, ingestion, or contact with skin. The hazard to mammals generally is greater, if the pesticide is inhaled, presumably because the body absorbs it from the lungs more quickly and completely than from the digestion tract or through the skin.

The most urgent need in evaluating airborne PESTICIDES is better air sampling procedures.

One union of OXIDES OF NITROGEN and HYDROCARBONS produces peroxyacl nitrate (PAN) that irritates eyes and damages mucous membranes. United States air quality officials are finding increasing reasons to associate respiratory ailments with these oxides, and accidentally high level exposure has caused fatal pneumonia. Children exposed to low levels of it over long periods of time are more susceptible to colds. A disturbing feature about this pollutant is that, as cars have the internal combustion engine improved to reduce hydrocarbons and carbon monoxide emissions, oxides of nitrogen increase.

VALLEY FEVER is caused by a fungus that grows in the dirt and becomes airborne to be taken into the lungs when breathing.

EFFECTS OF POLLUTION ON VEGETATION:

Vegetation is more sensitive than animals to many air contaminants, and methods have been developed that use plant response to measure and identify contaminants. Of the types of plant damage that air pollutants can cause, acute damage to tissue is the best documented. Only limited information is available on reduction in crop growth and productivity, and very little on chemical and physical changes in plant cells and on interference with plant enzyme systems.

Agricultural losses due to air pollution are over $500 million nationally - in California over $130 million a year. Leafy vegetables such as lettuce and spinach are not grown around Los Angeles any more.

Some trees have died, others are so far gone the United States Forest Service has leased the forests to commercial loggers.

University of Massachusetts pumped ozone into an experimental greenhouse at the same level that is found in Boston traffic on a sunny day. Carnations and geraniums, the test flowers, withered away and produced from a quarter to a third less of new growth.

WHAT CITIES AND STATES ARE DOING ABOUT POLLUTION:

TEXAS passes laws but does not enforce them. Industry gets by polluting air. Texas considers industrial well-being as coequal with human health, as stated in the TEXAS CLEAN AIR ACT OF 1967. A typical TEXAS cement plant is permitted to discharge 250 pounds of dust per hour, the same plant in Los Angeles would be in court for emitting 38% of that amount.

In 1969 New York City was bombarded with more man-made contaminants than any other city --- almost two pounds of soot and monoxide gases per day for every man, woman and child. The prevailing winds are all that has spared the city of unspeakable tragedy. The first episode recorded in 1953 took 300 lives. Similar occurences have followed in 1962 - 1963 and 1966. In 1968 and "Air Pollution Control Alert Warning System" was established by Major John Lindsay. New York has a budget of over four million dollars and a staff of three hundred, it is the second largest agency in the Nation. Los Angeles is the largest. Each year the department receives 32,000 air pollution complaints but only investigates about 15% and less than 2% result in summonses. New York's approach to the problem to date has been a failure.

NIAGARA FALLS, the popular honeymoon haven, has a heavy concentration of chemical industries. In February 1969 the National Air Pollution Control Administration reported that the city and immediate surroundings are clouded every day by an average emission of 150 tons of sulfur dioxides, particulates and carbon monoxide.[3]

CHICAGO has many types of plants and parts of the city are covered by bad odors and pollutants. Chicago city fathers, like in many cities, plan to clean up the air but accomplish very little ... generally getting by with the excuses that companies like the steel companies employ over 100,000 persons and these people are directly dependent upon the companies for their livelihood.

Among the states currently involved in comprehensive environmental planning and/or legislation regarding the development of statewide policies are: CALIFORNIA, COLORADO, CONNECTICUT, ILLINOIS, OREGON, VERMONT, NEVADA, NEW JERSEY, WASHINGTON, HAWAII, AND MAINE. All the plans express the need for the following general items: central coordination for Federal, State, and local programs; need to improve enforcement; need for additional legislation; need for State planning and uniform goals.

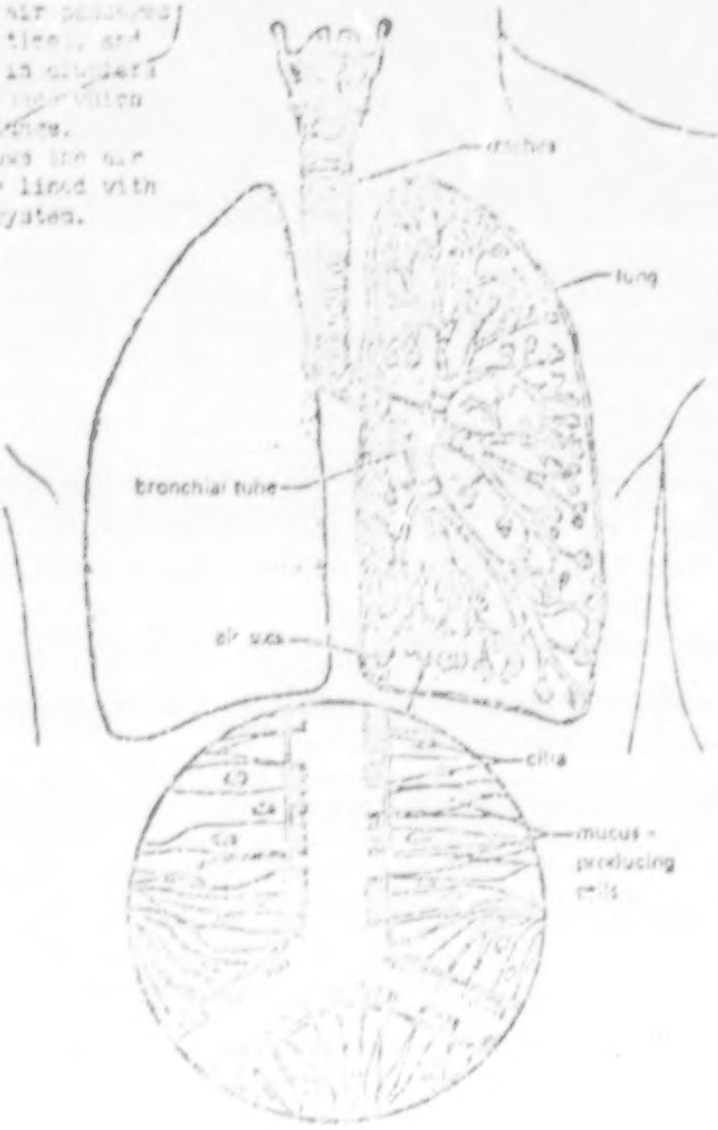
The Federal Government first officially recognized the existence of the air pollution problem in 1955. In 1963 the Clean Air Act established a program to provide grants to the states. In 1967 a comprehensive bill was enacted by Congress under the tutelage of Senator Muskie of Maine. The old program was retained but the Air Quality Act of 1967 set up schemes whereby the Federal Government would encourage the states to adopt standards. Despite increase in funding for air pollution from a few million dollars in 1950 to 112 million in 1971 the Federal presence and Federal leadership have been minimal.

"It's cheaper to pay claims than it is to control flourides." These are the words of an executive of the Reynolds Metals Company, quoted in an opinion written by a federal appeals court judge.[4] Such corporate calculus bears witness to society's failure to make the pollution of our environment unprofitable.

The air we breathe is our most basic natural resource, and it is not a limitless commodity. We may be making "progress" economically but we are ruining our basic requirement for sustaining life, the air around us.

BEST COPY AVAILABLE

In the human respiratory system, the air passages branch many times, and finally end in clusters of tiny air sacs which make up the lungs. Figure 1 shows the air passages are lined with a cleaning system.


trachea
lung
bronchial tube
air sacs
cilia
mucus-producing cells

This cleaning system can be damaged. For example, sulfur dioxide, smoke, and certain types of smog can damage the cells lining the air passages. Then so much mucus is produced that it clogs up the lungs. Pollution builds up in the larger passages. One coughs, wheezes, and chokes.

Figure 1

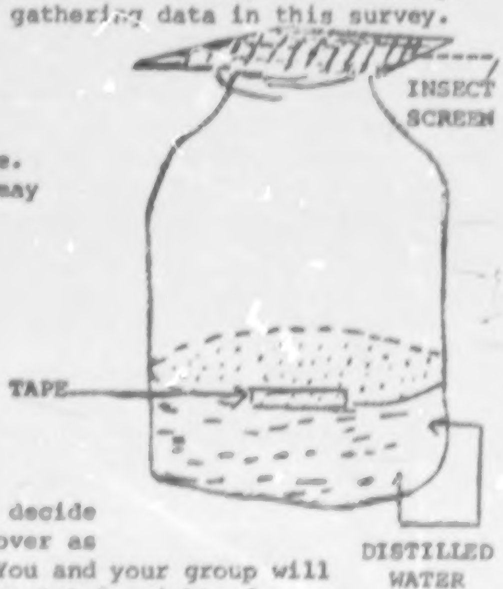
PART 11

LABORATORY EXPERIMENTS

LAB 1

SOLIDS IN AIR

PURPOSE: To find the amount of particulates in your location. This information will tell you how polluted the air is in your community. Each student will be responsible for gathering data in this survey.



MATERIALS AND EQUIPMENT

Wide mouth glass jar, one gallon size.
(School lunch rooms or a restaurant may furnish them.)
Map of the Community
Distilled water
Saucepan or evaporating dish
Hot plate or burner
Balance

PROCEDURE:

The class should look at the map and decide where to sample pollution. Try to cover as much of the community as possible. You and your group will collect samples. You will measure the total weight of pollution that settle down on a particular area. To find the weight of the particles that fall on your community will take a month. The easiest way to collect the particles is in jars of water. Then you can evaporate the water and weigh the particles that are left.

The jar should be cleaned and rinsed with distilled water. Pour one quart of distilled water into the jar. Label each jar at the water level with transparent waterproof adhesive tape and write name, date and location. Place a wire screen over the top to keep insects out. Be sure the screen is clean and that nothing drops into the water from the screen. Place the jar outdoors in an exposed place, 5 feet off the ground, where no unusual air currents whip around it. Add distilled water from time to time to keep the water level up to one quart. Let the jar sit undisturbed for 30 days.

Transfer all the liquid in the jar, a little at a time, into a weighed evaporating dish or pan. Rinse the jar and scrape the walls clean and pour the rinse solution into the evaporating dish or pan too. Evaporate the water slowly to avoid spattering. When the water has evaporated, let the pan cool off. Then weigh it again. Did the pan weigh more the second time? Any difference in weight should come from the particles that fell into the jar.

RECORDING DATA:

Record the location of your jar on the community map. Also record any differences in weight. Did you make any other observation?

ANALYZING DATA:

Now you know the weight of the particles that fell in your jar. How much fell in the neighborhood of the jar? To find out you have to do some arithemetic.

a. Measure the distance across the mouth of the jar, the diameter. Suppose, for example, that this distance is 20 centimeters.

b. Take one-half this number (10) to find the radius of the jar's mouth. Multiply the radius by itself (10 x 10), then by 3.14. This gives you the area of the jar's mouth in square centimeters. (314 cm^2). The formula is:

$$\frac{\text{diameter (cm)}}{2} \times \frac{\text{diameter (cm)}}{2} \times 3.14 = \text{area } (cm^2)$$

c. Divide the weight of the particles by the area of the jar's mouth:

$$\frac{\text{weight of particles}}{\text{area of jar's mouth}}$$

d. Multiply this number by 28.6. Now you know the number of tons of particles that fell on each square mile of your community in 30 days.

Did the same number of tons of pollution fall on each area in your community?

LAB 2 WHAT DO AIRBORNE PARTICLES LOOK LIKE?

PURPOSE: TO DISCOVER HOW POLLUTION PARTICLES DIFFER IN size, color, kinds and shape. Is the number of particles collected the same each day of the week?

MATERIALS:

Map of the community
Glass slides
Clear plastic millimeter ruler
Microscope
Clothespins
Vasoline

PROCEDURE:

Particles can be collected on a glass slide. Coat most of one side with a very thin layer of vasoline. Leave a place to pick it up. When this slide is exposed to air, particles will stick to it. Later you can observe these particles under a microscope.

You are responsible for collecting in one area. The class should agree on what areas to sample. Number the sampling areas on the community map. Take your coated slide to your sampling area.

Hang it on a string or clothesline with a spring-type clothespin. Or lay it on a flat surface. Collect the slide after 24 hours. Mark down on it the date and the location.

Observe your slide through a microscope. Are the particles different sizes and shapes? Are they all the same color?

You should compare your sample of air pollution with others. To do this you need to know the average number of particles in an area of your slide.

> Here is how to find the average number: Without looking through the eyepiece, center the slide on the stage. Focus the microscope and count the number of particles you can see. The area of the slide you can see at one time is called the field. Record the number of particles in the field.

PROCEDURE (Cont'd)

Now move the slide a short distance. Count and record the number of particles in this new field. Repeat this procedure several times. Make sure that you are looking at a different part of the slide each time. Now find the average number of particles in a field. Find the average number of particles by dividing the total number of particles by the number of fields you observed. Record this number.

Compare your number with classmate's.

RECORDING DATA:

You should have already described the particles you saw and recorded your particle counts.

Now you can record your observations on the map of the community. Put down the number of particles and the date you exposed the slide.

ANALYZING DATA:

Where did you find the most particles? Did you find more on weekdays than weekends? Can you explain the differences? Do the residential areas, highways and railroad tracks, industries, and dumps make different amounts of air pollution?

From the size, color, and shape of the particles, can you infer how many places they came from?

SUGGESTIONS FOR LABS THAT STUDENTS CAN SET UP WITH THEIR OWN IDEAS TO PROVE OR DISPROVE AIR POLLUTION PROBLEMS

Problem #1

HOW MUCH DIRT DO YOU INHALE?

Problem #2

CAN AIR POLLUTION HARM PEOPLE?

Problem #3

HOW DOES SULFUR DIOXIDE AFFECT PLANTS?

Problem #4

CAN YOU PROVE HOW NITROGEN OXIDE AFFECTS PLANTS OR ANIMALS?

Problem #5

HOW CAN AIR POLLUTION BE CONTROLLED?

Problem #6

CAN YOU SHOW HOW DIRTY AIR DETERIORATES MATERIALS SUCH AS NYLON, RUBBER, STONE AND ETC.

Problem #7

DO POLLUTION AND CORROSION WORK TOGETHER TO DESTROY?

Problem #8

WHAT DOES POLLUTION DO TO SUNLIGHT?

Problem #9

IS PHOENIX PARTICIPATING FULLY IN THE FEDERAL CLEAN AIR ACT?

Problem # 10

DO INDUSTRIAL USERS OF OIL AND COAL USE CONTROL DEVICES FOR SMOKE AND GASES?

FOOTNOTES

[1] Air Pollution Facts, National Tuberculosis and Respiratory Disease Association, 1970, P. 2.

[2] Litton Industries, Technical Report - "Air Pollution Aspects of Asbestos" September, 1969, P. 40.

[3] United States Department of Health, Education and Welfare, "Report for Consultation on the Buffalo Air Quality Control Region" (February, 1969)

[4] Reynolds Metals vs. Lampert, 324 F. 2d 465, 466 (9th Cir. 1963)

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Environmental Studies
in the
High School Biology Program

by

Thomas Messner

Introduction

Each academic year teachers are faced with the monumental task of deciding just what they will teach that year. The schedule may say Engligh I, Algebra II or Biology, but it is up to the teacher to sort out that material which is meaningful from that which is frivolous and that which is essential from that which is optional. He must then attempt to present that material which is relevant to the students in such a manner that they may grasp and comprehend it.

Biology instructors, perhaps more than any others, are faced daily with the enormous challenge of presenting the most meaningful material picked from an ever-growing array of topics dealing with that subject we call life.

Any group of biology instructors would agree that a unit on ecology should be included in a worthwhile biology program. However, just what material should be included in such a unit would be, again, subject to the training background, interest and sometimes whims of the instructor in question. In this paper the author will attempt to present what he feels should be included in an ecology unit in high school biology, along with devices and techniques that could be used to implement such a study.

(During the school year 1971-72 four biology instructors at Maryvale High School, Phoenix, Arizona will be embarking on a new program for teaching biology. Each teacher will teach his own units for nine weeks and then the students will rotate to a new teacher. The author of this paper will have the responsibility of teaching the ecology portion of the program and the unit is designed to last five weeks. A day by day lesson plan is not included, because of its lack of flexibility.)

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Introduction to Ecology

LECTURE-DISCUSSION MATERIALS:

Ecology - the scientific study of the inter-relationships between organisms and their environment

STUDENT ACTIVITIES:

Ecology Report - directions attached

Magazine - Newspaper Reports - directions attached

FILMS:

The World Around Us - 25 minutes - introduction to ecology

Ecology Reports

During our unit on ecology you will be exposed to numerous concepts and problems facing us today. In addition to studying and investigating them with lectures, discussions, textbook usage and laboratory exercises, you will be doing a library report. We will be spending two class periods in the library at which time both your instructor and the librarian will be available to assist you in finding material for your report.

The length of your report is not as critical as the quality. Depending on the subject, your report could be anywhere from five to fifteen pages in length. You may include charts, graphs, drawings, photographs, maps or any other material for your report.

The paper should be neatly written in ink (or typed) using proper grammar and form as if you were writing a paper for an English class.

A bibliography at the end of your paper should include the sources of your information. The author, title and date of the published material should be in your listing of sources.

You will have approximately three weeks to complete your report. If they are not handed in on the date due you may still hand them in with a penalty for being late.

Suggested Ecology Projects for Research

Physical Factors of Our Environment (pg. 544, Things to Do #3)
Federal Conservation Laws (pg. 588, #2)
The Tragedy of the Kaibab Deer Herd in Arizona
Pesticide Pollution Problems
Biological Control of Insect Pests
The Role of the Sportsman in Wildlife Management
Forest Management
The Malthusian and Neo-Malthusian Theory
The National Park Service
The National Forest Service
The Bureau of Land Management
The Depletion of our Mineral Resources
Wilderness Areas, What, Where, When and Why?
Flood Control Programs
Bird Migration (Patterns, etc.)
Biotic Rhythms
Geographic Distribution of Organisms
Plant and Animal Adaptations
The Salt River Project
The Flora and Fauna of the Desert
The Flora and Fauna of the Tropical Rain Forest

Ecology (Cont'd)

The Flora and Fauna of the Coniferous Forest
The Flora and Fuana of the Decidious Forest
The Flora and Fauna of the Arctic-Alpine Biome
The Flora and Fauna of the Arctic Biome
The Flora and Fauna of the Grassland Biome
Urban Renewal
Generation and Distribution of Electrical Energy
Transportation Problems in Urban Areas
Problems Facing the Florida Everglades
Brasilia-City of the Future
Succession of Plants and Animals
"New Towns"
State Environmental Planning
The Central Arizona Project

Any other topics that you wish to research must have prior approval of the instructor.

"Rap Day Articles"

There is a tremendous amount of current material published on the general topic of ecology. Newspapers daily have numerous articles on pollution, conservation and other subjects pertaining to man and his relationship to his environment. Popular magazines, science newsletters and professional journals often contain worthwhile articles on ecological topics.

During our unit on ecology you are expected to read at least one article a week concerning ecology and summarize it briefly on a 3x5 card. If newspaper articles are used, they should be at least six inches in length. Be sure you put the date and source of the article on your summary card. These will be due at the beginning of the class period on Fridays and will serve as the basis of our class discussion. If possible, you should have the article with you in case you wish to refer to it in your presentation to the class.

The Physical Factors Necessary for Life

LECTURE-DISCUSSION MATERIALS:
See attached outline

STUDENT ACTIVITIES:
Air Pollution Laboratory - directions attached
Soil Testing Laboratory - students will bring in soil samples and they will test them for plant nutrients and pH
Textbook Study Guide - (Biology - Weinberg)
Chapter 26 - part A

FILMS:

1. Plant Animal Communities: The Physical Environment
2. Problems of Conservation: Air
3. Problems of Conservation: Water

Physical Factors of Life

I. Soil:
  A. Source of minerals:
    1. vital to plant life - N P K, example 5-10-5, 21-0-0 (means nitrogen, phosphate and potash)
    2. trace elements - small amounts needed, example - Fe-chlorosis on citrus
    3. nitrogen cycle - nitrogen fixing bacteria, crop rotation and legumes
    4. leaching-water carrying minerals deep into soil

  B. pH of soil:
    1. pH scale - pH0 - acid
       pH7 - neutral
       pH14 - alkaline
    2. acid - sour soil (moist-cat tails, pines, gardenias) (5)
    3. alkaline - sweet soil (dry-cactus, creosote bush) (8)
    4. neutral - in between (most plants) (6.5)

  C. Organic material present:
    1. duff and litter - fresh, partially decayed vegetation
    2. humus - decayed organic matter
      a. caused by action of insects, fungi and bacteria
      b. retains moisture
      c. examples - peat moss, redwood compost, manure (also adds nitrogen)
         compost pile - decayed grass clippings, leaves, floor scraps
  D. Habitat for living things:
    1. subterranean - earthworms keep soil porous,
       gophers and rabbits are often destructive

II. Light:
  A. Physical properties:
    1. spectrum
       ultra violet - visible light - infrared
    2. destinies of light
      a. reflected - greenhouse effect
      b. transmitted
      c. absorbed

II. Light (Cont'd)

B. Used for photosynthesis:
  1. excited chlorophyll splits apart water molecule

$$H_2O + CO_2 \xrightarrow[\text{chlorophyll}]{\text{sunlight}} C_6H_{12}O_5 + O_2$$

  2. lack of light responsible for leaf coloration in fall

C. Preference for plants:
  1. shade lovers, sun lovers
  2. auxins cause bending, "stretching for light"

III. Water:

A. General facts:
  1. 71% of Earths surface covered with water
  2. life probably originated in water
  3. exists in three states
    a. gas - water vapor, humidity (relative)
    b. liquid - most common form (two-thirds of human body)
    c. solid - expansion of ice, one-tenth of its volume

B. Necessary for photosynthesis:
  1. see Light

C. Used in food assimilation:
  1. digestion
  2. transfer
  3. elimination
  4. storage

D. Vital to reproduction:
  1. external fertilization - sperm and egg are deposited in water
  2. internal fertilization - sperm must be kept moist in liquid carrier (semen)

E. Serves as a habitat:
  1. aquatic - fresh water
  2. marine - salt water
  3. amphibians - lives both on land and water

F. Determines the type of life in an area:
  1. hydrosere - wet area
  2. mesosere - average amount of water
  3. xerosere - dry area

IV. Air:

- A. Composition of the atmosphere:
    - nitrogen 78%
    - oxygen 21%
    - carbon dioxide
    - argon
    - xenon
    - neon
    - krypton
    - radon
    - helium
    - hydrogen
    - water vapor
    - dust
    - smoke
    - spores
    - pollen
        - particulates
    - ozone
    - sulfur dioxide
        - common pollutants
- B. Oxygen - Carbon Dioxide Cycle:
    - 1. CO_2 used for photosynthesis - see Light
    - 2. O_2 used for food assimilation
        - a. air inhaled - 21% O
        - b. air exhaled - 16% O
- C. Effect of altitude on living things:
    - 1. thin air - less oxygen
    - 2. red blood cells carry oxygen - therefore people living in high altitudes need more red blood cells (Olympic Athletes)
    - 3. brain damage to embryo if oxygen supply is cut off
        - a. Brave New World
        - b. care of pregnant women
        - c. more mentally retarded children born at high altitudes
- D. Wind:
    - 1. prevailing winds affect rainfall, can cause deserts
    - 2. influence plant growth
        - a. increases transpiration
        - b. pollination
        - c. seed dispersal
    - 3. factor in erosion - shelter belt

V. Temperature:

- A. Controlling factor governing activity in an area:
    - 1. migration - "move out"
    - 2. hibernation - "winter sleep"
    - 3. aestivation - "summer sleep"
    - 4. death
- B. Range for life:
    - 1. minimum - lowest temperature at which life can exist
    - 2. optimum - best operating temperature for living things
    - 3. maximum - highest temperature at which life can exist

C. Factors influencing temperature:
  1. latitude - 1 degree for every 300 miles at sea level
  2. altitude - 3 degrees per 1,000 elevation - (7 in Arizona summer)
  3. temperature inversion - layer of warm air above cold

D. Adaptation to temperature:
  1. cold and warm blooded organisms
  2. guard cell action on leaves

E. Concept of relative humidity:
  1. increasing air temperature allows more water vapor to enter the air

Air Pollution Laboratory

Introduction:

Two basic things make up "air pollution". They are particles (often called particulates) and gases. Smoke contains both. The particulates are soot and dust. Some of them settle out and others float around until they are washed out by rain and snow or combine with other substances. Complicated equipment is needed to detect and measure the gases. In this exercise you will be measuring the particulates found in the air in your community.

Materials needed:

a map of the community
a wide mouth jar (gallon if possible)
distilled water (the initial amount will be supplied to you and if more is needed you may purchase it at any supermarket)
a beaker or saucepan to evaporate water in
hotplate
balance

Procedure:

You and your classmates will be collecting samples throughout the community. Using a map, decide where the best places would be to place your collecting jars. The particles will be collected in your jars of water and then the water will be evaporated away and the particles left will be weighed. The experiment will last approximately four weeks.

1. Pour about a quart of distilled water in your jar. (If you are using a jar smaller than one gallon, fill it about one half full.) Mark the level of the water with a piece of masking tape or waterproof marker.

2. Label the jar with your name, date and location. You might like to identify your jar as part of a pollution experiment from your school.

3. If possible, place the jar about five feet from the ground. Observe it every three or four days. Add more distilled water when needed to keep it from drying out.

4. At the end of the experiment, cover the jar and bring it to school being careful not to spill it.

Procedure (Cont'd)

5. Accurately weigh the beaker or pan that you will be using to evaporate the water. Pour the water into the pan. Rinse you collecting jar with distilled water and pour it into your pan too. (Remove any large objects such as leaves or insects.)

6. Evaporate the water slowly.

7. After the pan has cooled, weigh it and subtract the original weight from your new weight to find the weight of the particulates collected. Find your weight in milligrams.

Recording and analyzing data:

1. Measure the distance across the mouth of the jar to get the diameter in centimeters.

2. Take one-half of this number and multiply it by itself (square the radius) and then multiply this number by 3.14. This now gives you the area in square centimeters.

3. Divide the weight of the particles by the area of the jar's mouth.

$$\frac{\text{weight of particles in milligrams}}{\text{area of jar's mouth in square centimeters}}$$

4. Multiply this number by 28.6. Now you know the number of tons of particles that fall on each square mile of your community in the time period tested. (28.6 is the conversion factor from milligrams per square centimeter to tons per square miles.)

5. Compare your figures to others collected from different areas.

Biology Study Guide
Chapter 26 - Section A

1. What is the thin zone close to the surface of the earth where life exists called? ____________________

2. Protists and minute organisms that live in the sea are called what? ____________________

3. The branch of biology that deals with the relationships of organisms to their environment is known as ______________________.

4-5. The surroundings of an organism is called its environment. This environment may be into two categories. They are the ____________ and the _______________.

6-7. Compare the terms weather and climate.
weather -
climate -

8. Mountains, valleys, plains and plateaus and other surface forms of the land are referred to as the ______________ of the land.

9. The false science of how planets affect man and other organisms in known as_________________.

10-11. Soil can be divided into two distinct layers. Name them.
______________ and _______________.

12. Dead, decaying organic matter in the soil is known as __________.

13. What is geochemistry? ____.

14. A lack of iodine in the soil can cause what ailment in humans?___.

15-18. List four ways which water vapor may be returned to the atmosphere. _______________, _______________, _______________, _____________.

19. What is transpiration? ____.

20. The conversion of nitrogen in the air to be a form usable to plants is called __________________.

21-22. The process just described is brought about by bacteria living in swellings on the roots of certain types of plants. The swellings are called ________________ and plants are called _________________.

23. Phosphorous rich bird excretions are called ______________________.

The Biotic Factors Necessary for Life

LECTURE-DISCUSSION MATERIALS:

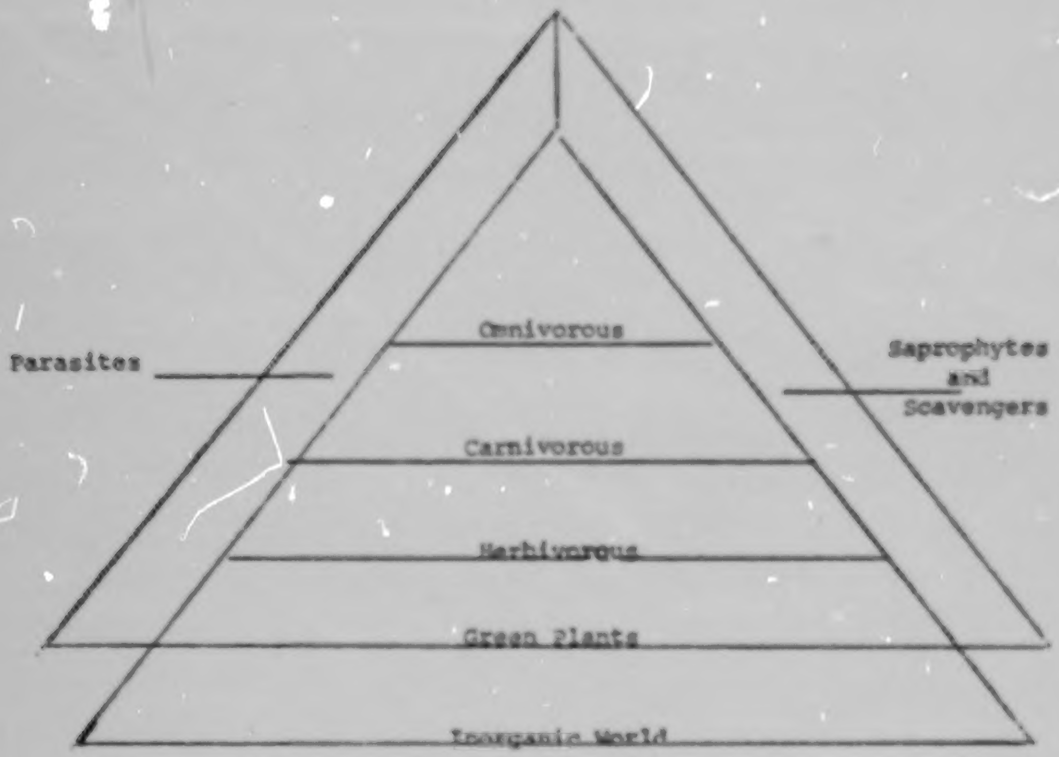
See attached diagrams and vocabulary list concerning
the food pyramid, food chains and food webs

STUDENT ACTIVITIES:

Population Sampling Laboratory - directions attached
Textbook Study Guide (Biology - Weinberg)
Chapter 26 - part B

FILMS:

A Strand Breaks - 17 minutes - natural balance
in an ecological community
Plant Animal Communities: Changing Balance of Nature
Population Ecology


Omnivorous
Parasites
Saprophytes and Scavengers
Carnivorous
Herbivorous
Green Plants
Inorganic World

THE FOOD PYRAMID

Inorganic World - soil, air, water, soil, temperature

Green Plants - only organisms capable of converting light energy into chemical energy

Herbivorous - plant eating animals

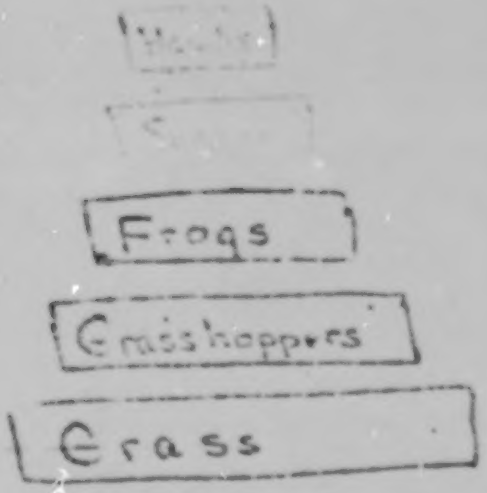
Carnivorous - flesh eating animals

Omnivorous - animals eath both plants and flesh

Parasites - living things that obtain their food from another living thing (host)

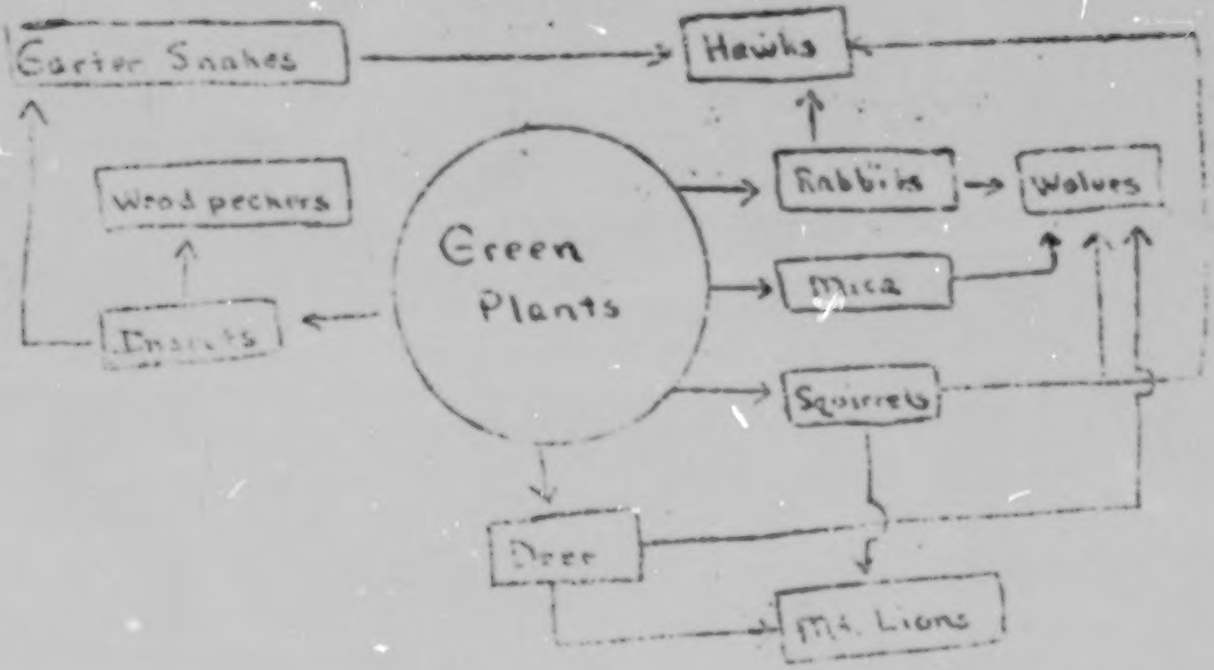
Saprophyte - plants that live off dead material

Scavengers - animals that live off dead material


Hawks
Snakes
Frogs
Grasshoppers
Grass

A Food Chain

BEST COPY AVAILABLE


Garter Snakes
Hawks
Woodpeckers
Green Plants
Rabbits
Wolves
Mice
Insects
Squirrels
Deer
Mt. Lions

A Food Web

Population Sampling Laboratory

Introduction:

A population may be defined as the number of individuals in a given area at a given time. Many textbooks have reading passages concerning predator-prey relationships. Often graphs and charts are shown giving relative numbers of each population involved. It is evident each individual in the population was not counted. The following exercise is designed to give you some insight concerning the techniques used in determining the populations of several organisms in a given area.

Materials needed:

- two plots of ground of different sizes marked off by your instructor in meters
- small styrofoam balls (at least two different sizes)
- meter stick
- stiff wire or coat hangers
- wire cutters
- pliers

Procedure:

1. Using the wire and tools construct a sampling device 10 centimeters square. This size would be referred to as a square decimeter although the term is not often used.

2. Measure the length and width of the plot in meters and then multiply each dimension by 10. Multiply these two dimensions to get the area of the plot in square decimeters. Write the area of the plot in the appropriate place on your chart.

4. Repeat this procedure ten times and find the average number enclosed each throw.

5. Multiply this average obtained by the total numbers of square decimeters (your area). This number now obtained is your estimate of the total population.

6. Move to the next plot and repeat steps 2 thru 5, estimate the total population in it.

Data Sheet

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Plot 1:
length x 10 = ____________
width x 10 = ____________
Area = ____________

Throws

Color	1	2	3	4	5	6	7	8	9	10	Total		Average
White												÷10	
Blue												÷10	

Color	Average	x Area	= Total
White			
Blue			

} ____________ = Total of both colors

Plot 2:
length x 10 = ____________
width x 10 = ____________
Area = ____________

Throws

Color	1	2	3	4	5	6	7	8	9	10	Total		Average
White												÷10	
Blue												÷10	

Color	Average	x Area	= Total
White			
Blue			

} ____________ = Total of both colors

Biology Study Guide
Chapter 26 - Section B

1. What is population?____.

2. Populations of different species living together combine to form a _____________________________________.

3. Feeding relationships within a community between all plants and animals is called a ____.

4. The basis of any food web or chain are __________________________.

5. Plant-eating animals are called _____________________________.

6. Flesh-eating animals are called _____________________________.

7. Animals that eat other animals are given the general name of _____________________________________.

8. The animals that get eaten by the animals mentioned in number 7 are generally called ______________________________________.

9. The combination of a community's special physical location and its special ecological functions, is called the ______________.

10. Any habit or structure that helps the organism fit into any environment is called what?____________________________________.

Questions 11-17 refer to the graphs on page 531.

11. Approximately how many years elapse between the peaks of the lynx population?____.

12. Approximately how many rabbits were there in 1864?_____________.

13. Why does the population of the lynx lay behind that of the rabbit?____.

14. What was the population of deer in the Kaibab plateau in 1905? _____________________________________.

15. How many deer could the land support at that time?_____________.

16. When were the predators killed in that area?___________________.

17. When did the population reach its greatest number?_____________.

Geographic Distribution of Organisms

LECTURE-DISCUSSION MATERIALS:

Define and discuss
- succession
- climax
- natural vegetation of Arizona
- desert ecology - adaptations of plants and animals to the desert

STUDENT ACTIVITIES:

- Textbook Study Guide (Biology - Weinberg)
  - Chapter 26 - Part C
- Altitude-Latitude Comparison - handout
- Deserts of North America - handout
- Map Study of Arizona
- Life Zones of Arizona - handout

FILMS:

- Life in Parched Lands - 30 minutes
- High Arctic Biome - 28 minutes
- Life in the Desert - 16 minutes
- Life in the Grasslands - 16 minutes
- Life in the Forest - 16 minutes

Biology Study Guide
Chapter 26 - Section C

1. Process of change in an area, with a series of different communities replacing each other, is called ________________.

2. A stable community of plants and animals in an area which is more or less permanent is called the ____________________.

3. Permanently frozen ground several feet down, characterized by bogmoss and lichen in the far north is called the ________.

4. The northern coniferous forest is called the ____________.

5. Why are the two life zones mentioned in number 3 and 4 not found in the Southern Hemisphere?______________________.

6. Land areas covered by trees such as oak, hickory, elm, chestnut and maple and animals such as deer, chipmunks and mountain lions are designated by what term?_____________________.

7. The jungle is better named the _________________________.

8. What is the difference between an aquatic and marine biome? ______________________________.

9. The study of the sea and the life in it is called _________.

10. The world distribution of organisms is studied in the science of ____________________________.

11. How many zones did Wallace divide the earth into?__________.

Give the proper zone for the following animals.

12. Rattlesnake - _______________.

13. Llama - ___________________.

14. Koala - ___________________.

15. Lion - ____________________.

16. Reindeer - _________________.

17. Cobra - ___________________.

Conservation of Natural Resources

LECTURE-DISCUSSION MATERIALS:
- Discussion of Silent Spring and pesticide pollution
- Biological control of insects

STUDENT ACTIVITIES:
- Textbook Study Guide (Biology-Weinberg)
  - Chapter 28

FILMS:
- Our Endangered Wildlife
- Population Explosion - 15 minutes
- Standing Room Only - 25 minutes

Biology Study Guide

Chapter 28

1. The effort to use the land while also preserving it for the future is called ________________.

2-3. Name the two types of natural resources and explain each.

4. How long does it take to form one inch of topsoil?__________.

5. The area from which a river takes its water is called a _____.

6. Watersheds are separated by heights of land called __________.

7. What is the upper surface of the underground water supply called?________________________.

8. What is the purpose of a mulch?________________________________.

9. "Leaching" means-

10. What is meant by green manure?______________________________.

11. Adapting wild organisms for human use is called ____________.

12. What causes sheet erosion?__________________________________.

13. What causes gullies and rills?______________________________.

14. What was the natural vegetation of the Dust Bowl region before man moved into it? _____________.

15. What crop did man plant in the Dust Bowl region in the 1930's?

16. Define soil banks.____.

17. What is a shelter belt?____________________________________.

18. What is the purpose of contour plowing and terracing?_______.

19. What is meant by crop rotation?____________________________.

20. What is a cover crop? ____________________________________.

21. Give some examples of cover crops.

22. What is a pesticide? ______________________________.

23. What is an insecticide? ____________________________.

24. What is a fungicide? _______________________________.

25. What was Rachel Carson's book, _Silent Spring_ about?_______.

26. Controlling insects without chemicals is called __________.

27. Name five organisms that are threatened with extinction.

28. What is meant by sustained yield?

29. What percent of Americans live in urban communities?______.

30. Aquatic saprophyte which normally break down and dispose of
human waste are being threatened by the presence of ______.

Applied Arithmetic in Ecology

by

Marvin E. Sounart

Abstract:

In the television film, "What Are We Doing To Our World," Walter Cronkite states that it would cost fifteen billion dollars to clean up Lake Erie, and another fifteen billion dollars to dispose of the total U.S. annual wastes. He implied that this was more than the Americans were willing to pay.

I have heard repeatedly by ecology advocates that we have to "change our value system." I take this to mean that we need to place a higher value on our environment with a complementing lower value on material goods and comforts of production. I'm not sure these advocates mean that we should spend *whatever* funds are needed to produce goods and comforts *without pollution*, or that we should produce fewer goods and comforts. Put another way, should a larger portion of our taxes and consumer dollar be spent on environmental protections as we produce for an ever increasing standard of living, or should we be willing to enjoy a lower standard of living--especially in the consumption of energy?

My position is that if we spend *whatever it takes* to clean up our environment and continue to spend *whatever it takes* to keep it clean, then we will be forced into a different standard of living and attitude towards our natural environment because of the large portions of our incomes that go into the preservation of this environment. "For where your treasure is, there will your heart be also."[1]

---

[1] Matthew 6:21

Abstract (Cont'd)

The cost of good ecology is very difficult to determine. This paper contains a variety of arithmetic problems designed to stimulate interest in ecology. Some of these problems will relate to the costs which will eventually have to be born by Mr. U.S. Citizen.

These problems are designed to be used as supplimentary material for review and relevant applications of concepts in arithmetic.

Environmental Problems

1. It has been estimated that it would cost $15,000,000,000 per year to dispose of all our industrial and municipal wastes without damaging our environment.

   (a) Taking our U.S. population to be 200 million, what would be the annual cost of U.S waste disposal per person?
   (b) The average U.S. family contains 4.3 persons. What would be the annual cost of U.S. waste disposal for this average family?
   (c) If a family made $9,000 per year, what per cent of its yearly income would be spent on waste disposal?
   (d) Is non-polluting waste disposal worth the cost?

2. The Four Corners thermal power plant in Farmington, New Mexico, generates 2,085,000 kilowatts of electrical energy. The total output of units 1,2, and 3 of this plant (owned and operated by Arizona Public Service Company) is 575,000 kilowatts. Units 4 and 5 generate 755,000 kilowatts each, with the power being distributed as follows:

Southern California Edison Co.	48%
Arizona Public Service Co.	15%
Public Service Co. of New Mexico	13%
Salt River Project	10%
Tucson Gas and Electric Co.	7%
El Paso Electric Co.	7%[2]

   (a) How many total kilowatts of electricity will go to the people of Arizona?
   (b) How many kilowatts will go to the people of California?
   (c) How many kilowatts will go to the people of New Mexico?
   (d) The total kilowatts to Arizona is what % of the plant's total output?
   (e) The total kilowatts to California is what % of the plant's total output?
   (f) The total kilowatts to New Mexico is what % of the total plant output?
   (g) Do you think that New Mexico is getting its fair share?

---

[2] *Fact Sheet, Four Corners Power Plant, Farmington, New Mexico,* July 7, 1971, P. 1.

Problems (Cont'd)

3. The state of New Mexico has an air quality law which will require the Four Corners Power Plant to collect at least 99.2% of the fly ash emission from that plant. In order to meet this requirement, wet scrubbers costing $14.5 million and bag filterhouses costing $24 million will be added to the electrostatic precipitators to remove the fly ash from the stacks.[3]

   (a) How much will it cost in additional equipment for this plant to meet the required New Mexico standard?
   (b) If the average residential customer uses 36 kwh. of electricity per day and the Four Corners Plant produces 48,000,000 kwh. per day, then what per cent of the plant's daily kwh. does the average residential customer use?
   (c) Using the answers to (a) and (b) above, what would be the average residential customer's share in the cost of this new equipment?

4. In 1970 the Four Corners Plant in New Mexico consumed an average of 15,856 tons of coal per day which contained a total average ash content of 3,458 tons daily.[4]

   (a) If 99.2% of the ash is collected by the new pollution control equipment, then how many tons of ash will go out the stacks into the air daily using the coal indicated above?
   (b) In 1970, without the new air pollution control equipment, 264 tons of ash per day actually went out the stacks. The answer to (a) above is what decimal part (to the nearest hundredth) of the 264 tons per day are presently being emitted?

5. The U.S. Bureau of Reclamation estimates the cost of the Central Arizona Project to be $832,000,000 based on 1968 prices. The project will take ten years to build and is to be completed around 1982.[5] If the cost increases by 30% over the 1968 estimate due to inflation, then what would the total cost be, including the increase due to inflation?

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[3] Ibid., p. 2,3.

[4] Ibid., p. 5.

[5] Rich Johnson, "Water Supply--Basic Economic and Social Resource," Studies in Depth (The Arizona Bank, Second Quarter, 1970), p. 1.

6. The CAP will require 3.5 million cubic yards of concrete in its construction.[6] If this amount of concrete was made into a sidewalk 1 yard wide and 6 inches thick, would the sidewalk be long enough to go approximately halfway around the earth? (Use 25,000 miles for earth's circumference.)

7. Water from the Central Arizona Project will require a pump lift of 1200 feet from Lake Havasu to Orme Dam and then another 460 feet from passage through the Picacho Mountains towards Tucson.[7] This will require 560 megawatts of power from the planned Navajo Thermal Generating Station near Page, Arizona. The Navajo plant will generate a total of 2,310 megawatts of electricity. What per cent of the total electrical power of the Navajo plant will go to power the CAP pumps?

8. The stacks on the proposed Navajo power plant will be 775 feet high. Is this higher than the Washington Monument? Why should these stacks be so high?

9. The Navajo plant will use 17,500 tons of coal per day from the Black Mesa in northern Arizona. How many tons of coal will be used by this plant in 10 years? (Used 365 days per year.)

10. The Navajo Power Plant will generate 2.31 million kw. of electricity. The Salt River Project Company will own 21.7% of this project. The power plant will cost $404 million, the transmission facilities $179 million, and an 80 mile electric railroad to the Black Mesa coal fields $54 million. Included in the $404 million is $90 million for environmental protection.[8]

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[6] Central Arizona Project, U.S. Gov't. Print. Office: 1970-0-373-280.

[7] Ibid.

[8] Salt River Project 1970 Annual Report, p.6.

Problems (Cont'd)

(a) What will be the total cost of this Navajo project?

(b) What will be Salt River Project's share in the cost of the facilities for environmental protection? (at 21.7%)

(c) Forty two per cent of Salt River Project's revenue comes from residential sales.[9] Using this rate, what will be the cost for environmental protection at the Navajo plant to Salt River Project residenital customers?

(d) Using the 156,401 residential customers of The Salt River Project at the end of 1970,[10] what would be the cost for environmental protection at this new power plant to each SRP residential customer?

(e) Is it worth the cost?

11. Use the information in the letter on the next page to answer the following questions:

(a) What kind of material takes up nearly half of Phoenix refuse?

(b) Metals and glass make up what per cent of the total refuse?

(c) Do you think this metal and glass is suitable for recycling?

(d) Do you think that the disposal of waste plastic is a problem in Phoenix?

(e) In the first half of 1971 The Phoenix Waste Disposal Division disposed of approximately 30,000,000 pounds per week of refuse at their sanitary landfills. How many pounds per week of this waste was made up of each of the following: ferrous metal, non-ferrous metal, glass and ceramics?

12. Suppose one day in 1971 a Phoenix landfill received 500 tons of refuse taking up 900 cubic yards after being compacted. Will the density of this fill meet the city requirement of 1000 pounds per cubic yard?

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[9] Ibid., p. 16.

[10] Ibid., p. 29.

June 2, 1971

Mr. Glendening, Deputy City Manager
for Operations
Mr. McSpadden, Sanitation Director

CONSOLIDATION OF REPORT DATED MAY 25, 1971 - COMPOSITION OF REFUSE IN PHOENIX

You requested that I consolidate the report of the above date. You further requested I use the specific classifications you suggested.

With these classifications as a base, the following percentages by weight would apply:

Paper	40.6%	Glass and Ceramics	3.1%
Yard Refuse	26.6	Garbage	2.1
Dirt and Rubble	16.9	Plastics and Textiles	1.9
Liquid Waste	4.0	Nonferrous Metals	1.3
Ferrous Metal	3.5		

Again, I must remind you that these figures are estimates using the most recent figures available to us from a source that we can evaluate their collection policies with our policies and adjust accordingly.

Original signed by:
W. C. McSpadden
DIRECTOR
SANITATION DEPARTMENT

W. C. McSpadden, Director
Sanitation Department

WCM:mme
cc: Mr. Bill Cardwell

Problems (Cont'd)

13. Paper making in the United States today uses about 20% recycled paper fiber while France, United Kingdom, Japan and West Germany recycle from 30 to 46 per cent of their papermaking fibers.[11] Why do we recycle less than these other countries?

Weekly Report

Beverage Industry Recycling Program
22nd Avenue and Lower Buckeye Road
Phoenix, Arizona

Pounds per Week

Week ending	Aluminum	Tin steel	Glass	Sum
4-3-71	1712	2195	5453	9360
4-10-71	4691	5833	15380	25904
4-17-71	5372	11699	9763	26834
4-24-71	11264	8346	40197	59807
5-1-71	15418	11030	77071	103519
5-8-71	19061	10318	27189	56558
5-15-71	25273	12561	32898	70732
5-22-71	21052	14541	73886	109479
5-29-71	35213	15372	51395	101979
6-5-71	20935	19837	30214	70986
6-12-71	23480	21955	107943	153378
6-19-71	37101	22247	102060	161408
6-26-71	32978	18786	30798	82562
7-3-71	26974	23183	36987	87144

14. Use the chart above to answer the following questions:

(a) What is the average number of pounds per week for the last 6 weeks in each of the 4 categories.

(b) The average number of pounds per week of aluminum above is what per cent of the number of pounds per week of non-ferrous metal disposed in Phoenix as waste. (see question 11. (e))

(c) and (d) Do the same as in (b) for the steel (ferrous metal) and glass (glass and ceramics).

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[11] "Recycling in the Paper and Board Industry," excerpted from a speech made by Jack L. Diltz, Beloit Corp.

15. Mr. William Cardwell, Disposal Superintendant of the Phoenix Sanitation Department, cites the following information gathered in a recent study relating to recycling Phoenix refuse: Under this program householders will have to separate metals, clear glass, colored glass, and newspaper from the other refuse. Presently, an average of 14 pounds out of 46 pounds per household per week of collected refuse is in the four categories listed above which are considered recyclable. Metals and glass would be picked up every 3 months, and newspapers every 2 weeks. Other refuse would be picked up twice a week as usual. These extra pickups would require 35 more crews and vehicles. The operating cost for these extra crews and vehibles would be $1,371,648. At current prices the city would receive $807,500 through the sale of the recyclables.

    (a) What would be the net cost to the city for this extra service?
    (b) Using 580,000 as population of Phoenix, what would be the cost per person for this extra service?

16. Use the table on the following page to answer these questions:

    (a) What 2 industries spent the highest per cent of their capital expenditures in air and water pollution control in 1969?
    (b) What industries spent under 2% of their capital expenditures in air and water pollution control in 1969?
    (c) What industry will have the greatest rate of increase in its capital expenditures for air and water pollution control from 1968 to 1970?
    (d) Are the industries with the higher percentages of their capital expenditures for air and water pollution control less polluting than the others?

17. The 91st Avenue Sewage Treatment Plant presently treats approximately 52 million gallons per day of sewage water. Future plans call for the plant to be able to treat 240 million gallons per day.

    (a) How many gallons will this expanded plant be able to treat in 365 days?
    (b) How much water is this in acre feet? (1 acre foot = 325,850 gallons).
    (c) The Central Arizona Project will bring 1.2 million acre feet of water to Central Arizona. The amount of possible treated water in (b) above is what per cent of the amount of water coming from CAP?
    (d) Should this sewage water be reclaimed for irrigation?

"BEST COPY AVAILABLE"

Table 2 Industry's Investment in Air and Water Pollution Control 1967-70

	—1967 Actual—		—1968 Actual—		—1969 Actual—		—1970 Planned	
	Percent*	Million $	Percent	Million $	Percent	Million $	Percent	Million $
Iron & Steel	6%	$ 130	5.23%	$ 119	8.30%	$ 179	9.85%	$ 199
Nonferrous Metals	4	43	1.41	15	3.73	41	7.06	84
Electrical Machinery	1	17	3.00	53	1.58	32	2.38	54
Machinery	1	29	2.10	60	1.48	51	2.49	95
Autos, Trucks & Parts	4	62	1.96	27	3.33	55	5.86	69
Aerospace	1	9	1.87	16	2.65	22	2.73	18
Other Transportation Equipment	2	5	4.26	11	5.36	15	3.61	11
Stone, Clay & Glass	5	48	4.65	40	5.89	63	7.42	95
Fabricated Metals	2	22	3.36	41	3.52	44	5.57	64
Instruments	1	5	1.02	6	3.52	25	4.09	36
Other Durables	2	18	2.00	21	7.01	103	1.82	64
TOTAL DURABLES	2.76	388	2.90	400	3.95	630	4.81	808
Chemicals	3	92	3.85	109	4.52	140	6.22	226
Paper	6	94	6.20	82	9.05	143	11.02	181
Rubber	1	7	1.00	10	.83	9	2.13	[illegible]
Petroleum	2	102	3.23	170	4.62	260	1.41	[illegible]
Textiles	1	7	1.73	9	1.59	10	3.65	[illegible]
Food & Beverages	2	42	1.06	23	2.24	58	3.24	61
Other Nondurables	5	53	1.80	20	2.82	31	4.42	[illegible]
TOTAL NONDURABLES	2.75	397	2.97	423	4.14	651	4.74	[illegible]
ALL MANUFACTURING	2.75	785	2.93	832	4.04	1,281	4.78	[illegible]
Mining	4	66	3.45	56	5.65	105	6.03	[illegible]
Electrical Utilities	2	135	2.86	219	1.73	155	3.59	[illegible]
Gas Utilities	4	80	1.00	25	4.87	110	6.01	[illegible]
INDUSTRY TOTAL	3.00	1,066	2.82	1,132	3.70	1,671	4.62	[illegible]

SOURCE: McGraw-Hill Publishing Co.

*Percent of total capital expenditures

Problems (Cont'd)

18. The following table is a result of a recent shopping survey at Bashas' supermarket and Sears Department Store.

Detergent	Weight	Price	Recommended Amount for normal load
Tide	10 lb. 11 oz.	$2.98	4 oz.
Dash	20 lb.	$4.85	4 oz.
....			
Sears (non-polluting)	20 lb.	$4.99	4 oz.
Phos-Free	20 lb.	$2.89	4 oz.
Ecolo-G	10 lb.	$1.99	6 oz.

The 2 entries above the dotted line are popular detergents high in phosphates. The ones below the line are phosphate-free.

(a) Find the cost per normal load for each detergent.
(b) Are phosphate-free detergents more expensive to use than the popular high phosphate detergents?
(c) Why do most housewives still use high phosphate detergents?

Answer Key

(very few of these answers are exact)

1. (a) $75
(b) $322.50
(c) 3.6%

2. (a) 1,058,200 kw.
(b) 724,800 kw.
(c) 196,300 kw.
(d) 50.8%
(e) 34.8%
(f) 9.4%

3. (a) $38,500,000
(b) .000075%
(c) $28.88

4. (a) 27.7 tons
(b) .10

5. $1,081,600,000

6. Yes

7. 24%

8. Yes (Washington Monument 555 ft. high)

9. 63,875,000 tons

10. (a) $637,000,000
(b) $ 19,530,000
(c) $ 8,202,600
(d) $ 52.45

11. (a) Paper
(b) 7.9%
(c) ferrous metal: 1,050,000#
non-ferrous metal: 390,000#
glass and ceramics: 930,000#

12. Yes

14. (a)

Aluminum	Tin Steel	Glass	Sum
29,447	20,230	59,900	109,577

(b) 7.6%
(c) 1.9%
(d) 6.4%

Answer Key (Cont'd)

15. (a) $564,148
(b) $ .97

16. (a) Paper, iron and steel
(b) Electric machines, machines, rubber, textiles, electric utilities
(c) Gas utilities

17. (a) 87,600,000,000 gal.
(b) About 270,000 acre ft.
(c) 22.5%

18. (a) Tide: about 7¢
Dash and Sears: about 6¢
Phos-Free: about 3½¢
Ecolo-G: about 7½¢

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SAVING OUR ENVIRONMENT THROUGH EDUCATION

by

William H. Rosenberg

INTRODUCTION

This paper has been written to develop an environment program which will maintain student awareness in the technical and vocational shops.

The importance of effective implementation of an environmental program cannot be stressed enough. Students of today are concerned about the rapidly deteriorating environment surrounding them. Therefore, it behooves us as instructors to include in our curricula an environmental program. The information provided in this paper can serve as a guide to those instructors and administrators responsible for implementation of an environment program.

Today the need for specific emphasis on conservation, natural resources and environmental education is greater than ever. Therefore, it is essential that environmental education appear in our curricula. The responsibility of the Vocational-Technical teacher does not end with the teaching of fundamental skills, increasing knowledge acquired in the lower classes, and developing special skills for job competency. Since the student is being prepared for the world of work, we can also make him better aware of the environment he is going to live in; making him better prepared to enter industry. This can best be done by implementing a sound education program that includes ecology.

In order to develop a sound program we must develop the individual awareness which is the key factor to solving problems. We can and must, as instructors, make the students aware of the many issues that confront our environment--the traffic problems, recycling air, and water pollution, population explosion, etc. The emphasis on the seriousness of these problems can no longer be ignored.

We in education have a challenge to meet which requires the presentation in our programs of ecology problems that face our environment today. Through education we can reach the students with examples that will develop individual awareness related directly or indirectly to their courses of study. This can be done by making the student aware on the first day of class by handing out a mimeographed pamphlet with information relating to the critical problems that face mankind today.

These will be followed up with a short quiz and review with the instructor in order to maintain student awareness.

The effectiveness of this program will be dependent on the instructor periodically discussing the severity of the problems. Also necessary will be the display of posters, slide presentations, movies, field trips, speakers, and all sources of information that will keep the student constantly aware of the problems. The enforcement of this program cannot be forced upon the student with allowance being made for added credit to any one turning in an outstanding outside assignment.

The Vocational-Technical classrooms that this environmental program may be included are:

All automotive area
Aircraft powerplant
Appliance repair
Auto body and reconditioning
Auto upholstry
Basic Art
Biology
Cabinet making
Carpentry
Ceramics
Chemistry
Commercial art
Drafting
Earth and space science
Electticity-electronics
General Science
Graphic arts
Graphics
Industrial electricity
Landscape gardening
Metal working
Offset printing
Plastics
Power mechanics
Power sewing
Photography
Physics
Radio and television
Refrigeration
Sculpture

classrooms (Cont'd)

Electronics assembly

Food services

Furniture upholstery

Machine Shop

Sheet metal

Truck diesel

Welding

Woodworking

In these areas, all instructors will include an environmental program at all times. Keeping the students informed of the seriousness of the threat to mankind.

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Curricular Guide To ECOLOGY

by

Catherine Meibert

ABSTRACT

In this paper I shall explain the ecology unit which was presented to her students by Mrs. Judith Harkleroad, social studies instructor at South Mountain High School, 5401 S. Seventh St., Phoenix.

Mrs. Harkleroad's students spent three weeks' time in research, project preparation, and activities related to ecology. The project was done on an experimental basis during the second semester, 1971. The students were juniors, enrolled in four United States history classes, and seniors, in one American government class. In total, they numbered approximately 150.

Group work, individual research, and interchange of ideas were a major part of the time spent. A speaker was engaged who talked about problems of ecology in the City of Phoenix.

The entire project was timed to coincide with National Earth Week, April 19 through April 25 (Earth Day).

Since I am a journalism teacher, I have prepared the paper as I would have my students do--newspaper style. This entire project of mine could easily be a project of my news staff for publication in the school paper.

INTRODUCTION OF THE UNIT

Mrs. Harkleroad introduced the unit through a lecture about ecological problems, a display of pictures of dramatic problems in ecology, and by use of Life Education Reprints Series on pollution.

She explained that each student would work simultaneously on two areas: independent research and an activity related to ecology.

Research areas could include the following topics: over-population, air pollution, water pollution, wildlife conservation, and solid waste.

Activities could include participation in bulletin board committees, Ecology Day activity committees, poster committees, and a publicity committee.

Each student was also to be responsible for reading and reporting in written form material concerned with his own area of research.

RESEARCH PROJECTS

In researching the problems, the students were encouraged to read books, magazine articles, and newspaper accounts of their particular ecological interest. They utilized the school library as well as city library facilities. They could also interview persons who could contribute to their knowledge of the particular problem under consideration.

Information that they researched was in conjunction with planning their activities. Mrs. Harkleroad feels that next year an extension of time will allow for the students to produce a type of problem paper for which the three week time period in 1971 did not allow.

Sharing information with their fellow students was also encouraged. Groups having similar topics met, discussed their situations, and selected a spokesman who presented that particular phase of ecology to the entire class.

Summaries of the magazine readings were required of each student. These could be done either by using 3 x 5 cards or by formal reviews typed or hand-written in ink. Magazines used are listed in the bibliography.

ACTIVITIES

Activities included a bulletin board competition between committees from each of the five classes involved. Teachers from areas other than social studies were asked to judge the bulletin boards, and a prize was awarded the best display of an ecological problem.

In preparing for the bulletin boards, the groups consulted students within their own class for ideas and topics.

Ecology Day (April 25) committees prepared several activities. Arm bands were furnished each student in the class. An entire class period was used to call attention to campus ecological problems. Clearance for students to be on campus was obtained through the administrative offices.

Students made posters and picket signs and marched in front of the high school. They urged people to observe ecological principles and distributed litter bags to motorists.

An interesteng side-light is the fact that the litter bags, obtained through donation from the Salt River Project were made of plastic. One of the students wrote a thank you letter to the Project urging them to distribute bags made of paper next year, in the interest of ecology.

Posters asking people to help with ecology were put up all over the campus.

Ear muffs, surgical masks, and gas masks were brought in by the students and worn during their hour on campus.

ACTIVITIES FIRST TAKE

An inspection team of students visited each classroom and distributed litter bags and a poster. Later in the day another inspection team rated each classroom for litter and anti-pollution practices.

SPEAKER

For this project Steve Carter, an administrative assistant from the office of Phoenix Mayor Driggs, was asked to discuss ecology problems of the city.

In his talk Carter commented that few, if any, attempts were being made by the city to curb ecological problems. He felt that a definite need exists in Phoenix for this, but also believed that little would be done in the future about the situation.

The students were appalled.

He told them that if the public made it known through petition and attendance at city council meetings, some hope for a resolution of the problem was possible.

There is a problem with the scheduling of speakers, since the entire group could not be scheduled to hear him at the same time. Mrs. Harkleroad believes that scheduling speakers at various times for each group would be of great benefit. The groups could then prepare a summary of each speaker's remarks and present it to those groups unable to hear him.

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Man and Environment: An Approach to Including Ecology Throughout a Camping Unit in Girls' Physical Education

by

Regna F. Breneman

ABSTRACT

Statement of Purpose. It was the purpose of this paper to denote the importance of ecology in a camping unit in the Girls' Physical Education Program of the Phoenix Union High School System. Studies in the phases of ecological consideration of camping were: Balance of Nature as found in the mountain and desert areas, Water Sources and Conservation, Self-Protection and Survival, and Food Selection and Care. These phases were thought to be most practically important in camping.

Method of Procedure. Through the attendance of the workshop--Man and Environment--conducted by Dr. Robert G. Hershberger, Associate Professor in the College of Architecture of Arizona State University, methods of approaching the purpose of the paper were discovered. The use of resource speakers was experienced and found valuable. Specialists of ecological emphasis in outdoor living were suggested in this paper. Resource books and films were discovered through materials supplied by Project Outreach. It was desired that materials and suggestions found through the workshop would be useful to others who might include camping in their program.

Summary. Ecology has become widely publicized and has reached all phases of education. The inclusion of camping in a Girls' Physical Education Program seemed to be a natural laboratory situation of ecological importance. It was suggested that background materials could be covered in classes on campus. Situations involving ecology in action could be experienced on cook-outs and camping trips.

Man and Environment: An Approach to Including Ecology Throughout a Camping Unit in Girls' Physical Education

Introduction. Inasmuch as a unit in Camping or Outdoor Living was included in the revised Girls' Physical Education Teaching Guide of the Phoenix Union High School System of 1971, it seemed plausible that some emphasis should be placed on Ecology in this unit. It was felt that stressing ecological values through outdoor living, there would be less overlapping or repetition of other high school courses. Suggestions pertaining to the ecological phases of camping were limited to the conditions and areas most accessible to Phoenix, Arizona.

Properties of the Camping Unit. The main properties of camping through which ecology could be stressed were selected as: the balance of nature in mountain and desert areas; water sources and conservation; self-protection and survival; food selection, transportation, preparation and refuse disposal.

It seemed logical that much basic information pertaining to the listed phases could be covered in classes and on campus sites before outdoor trips were scheduled. The emphasis on ecology in teaching basic techniques of camping would naturally begin with background information relating to the balance of nature.

Balance of Nature. The study of nature could be effectively covered by a general review of John Storer's book, The Web of Life. Resource speakers versed in the facts concerning nature, environment, and conservation should be invited to speak to the classes. Specialists could be obtained from Arizona State University, National Forest Service, County Agents, and other community organizations. Films available through Project Outreach could be used as supplemental material. A few films pertaining to the balance of nature are: "The Mountains", "Our Endangered Wildlife", "The Prairie Killers", and "Our Vanishing Lands".

Water Sources and Conservation. Careful transportation and conservation of water while camping should be stressed, as the supply of water could determine the success and enjoyment of a camping experience. Gallon size plastic containers were suggested for the transportation of water. Most water found in camping areas could be considered usable. However, should there be a question as to the safeness of the water, one should have available for use water purification tablets. The tablets could be obtained from a drug store and should be included in the equipment for all trips.

Water conditions of the area could be studied through materials obtained from the Salt River Project and resource speakers from the community could be valuable in this study. Films available are: "The Problem with Water is People", "Problems of Conservation: Water", and "Slow Death of Desert Water".

Self-Protection and Survival. Much the same methods previously mentioned could be used in discussing this phase. However, special attention should be given to the preparations for an outing. The choice of proper equipment; how to pack; methods of conserving water and fire wood; and the protection of natural resources should be stressed. Excellent speakers from Desert Survival Groups could be requested to demonstrate the use of survival kits. Students should be encouraged to seek articles denoting survival situations. Information edited by Louis E. Roninger, Lt. Col. AUS (Ret.) entitled, "Desert Survival" has been published by joint Maricopa County Civil Defense and Disaster Organization. Pamphlets were available through the First National Bank of Arizona.

On campus sites could be used for demonstrations of a water still. The construction of wind and sun protections should be a class project before camping on the desert.

Food: Selection, Transportation, and Preparation. Concentrated attention should be given to this area of outdoor living. The types of foods appropriate for camping vary greatly and depend upon the modes of travel. Simple cook-outs would involve different food planning. Examples of this would be hiking or bicycle trips. The time of the year and the climatic conditions should be considered in food selection. The duration of the trip should determine the menus. Transportation and storage containers for foods could be used as cooking containers. For example, coffee cans would provide multi-purpose uses. Current ideas were found in Sunset Magazine, July 1971 issue. An article therein titled, "The One-Pot (of No-Pot) Camp Meal" explained how easy good meals could be prepared with limited equipment. Some preparation of foods would conserve water and fire properties. Limited use of non-inflammable containers would curtail refuse. Paper cartons and wrappers could be used as fire starters. Animal and bird feeders could provide ecological disposal of food scraps. Note: Buried food refuse seldom remains hidden.

Summary. Ecology has become prominent in every element of everyday life. Emphasis of ecology has reached all phases of education. Therefore, this paper was an attempt to suggest methods of giving ecological importance to a camping unit. As outdoor living could be considered a laboratory of ecology awareness, background materials were sought which could be offered to students previous to an actual experience of ecology in action. The most relevant information seemed to be: (1) resource speakers who were specialists in their areas, (2) films available through Project Outreach, and (3) class demonstrations performed on campus involving student participation. The ultimate use of the class and campus activities should be scheduled cook-outs and trips.

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Films

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Cat. No.		
E21	The Mountains	(E-J-H-C-A)
E22	Our Endangered Wildlife-Parts I & II	(E-J-H-C-A)
E27	The Prairie Killers	(E-J-H-C-A)
E24	Our Vanishing Lands	(E-J-H-C-A)
E28	The Problem with Water is People	(H-C-A)
E30	Problems of Conservation: Water	(J-H-C-A)
E36	Slow Death of the Desert Water	(E-J-H-C-A)

PHOENIX AND ITS ENVIRONMENT

A Multidisciplinary Unit Course
Utilizing the Disciplines
of
Political Science and the Science of Chemistry

by

John and Marilee Murray

ABSTRACT

PHOENIX AND ITS ENVIRONMENT

By

John and Marilee Murray

Phoenix is one of the fastest growing cities in the United States. One of a multitude of growing pains is pollution--air, water and land. A twofold approach was used in our interdisciplinary political science and chemistry unit on Phoenix's environmental problems in order to better equip students in assuming a vital role in the shaping of Phoenix as they wish it to be in 2000. An understanding of the scientific, in particular chemical, aspects of the nature and possible solutions to the problems is one ingredient in the forming of rational decisions regarding priorities. A working knowledge of the structure of the local government and the citizen's role within this framework is a second essential in the actual establishing of desired priorities. To accomplish these goals the students will be exposed to relevant facts and theories by means of community resources, current literature and personal investigation and experiment. With this background a final project will have students propose workable policies to solve the problems within the government framework. Ideally this would instill a permanent involvement in the planning and promoting of desired changes.

"The air, the water, and the ground are free gifts to men and no one has the power to portion them out in parcels. Man must drink and breathe and walk and therefore each man has a right to his fair share of each."

James Fenimore Cooper, The Prairie

INTRODUCTION

What do you want Phoenix to be in 2000? What can you do to make it like this? Phoenix is one of the fastest growing cities in the United States. One of a multitude of growing pains is pollution--air, water and land. On the one hand, technology has been decried as the sole cause of our problems. On the other hand, technology has been acclaimed as the automatic cure-all. Neither extreme is accurate. Obviously pollution can be traced to the technology which supports our affluent society. "Technology itself, however, is not the guilty party, for we also currently possess the technology to abate all but a very minor portion of our present environmental pollution."[1] Because this statement referred to 1967, it would also appear obvious that the real problem is one of priorities. Among some suggestions, for instance, given by Dr. Mina Rees in a recent speech to the ASU Chapter of the American Association for the Advancement of Science were:

1. "Instead of denouncing scientists, employ them to solve problems posed by technological advances. Employ them to find ways to recycle wastes and to cut down on pollution.
2. Recognize that social choice (profit or pollution) requires careful analysis of costs and benefits for man. Recognize that man must be fully and accurately informed of the consequences of given developments.
3. Build . . . .a political structure that permits and expects citizens to participate in the decisions that society must make about uses of science. Provide better education for everyone in the problems with which they must cope."

---

[1] James Swan, "Response to Air Pollution", Environment and Behavior, Vol. 2, No. 2, pp. 127-152, September, 1970.

Assuming pollution is a significant problem to Phoenix, the purpose of this unit therefore, is twofold. An understanding of the scientific, in particular chemical, aspects of the nature and possible solutions to the problems is one ingredient in forming rational decisions regarding priorities. A working knowledge of the structure of the local government and the citizen's role within this framework is a second essential in the actual establishing of desired priorities.

The students will be exposed to relevant facts and theories by means of community resources, current literature and personal investigation and experiment, with the end result that they will become actively involved in the planning and promoting of desired changes.

BEHAVIORAL OBJECTIVES

At the end of this unit the student should be able:

To respond to questions concerning the major departments found in Phoenix city government.

To chart the Phoenix city government, outlining the type of government, make-up of the city council, and placement of powers in our city system.

To determine difficulties or problems in establishing a metropolitan area government.

To analyze the factors that are involved in planning Phoenix for the future.

To compile a list of advantages and disadvantages of further growth of Phoenix.

To identify the environmental problems of the city of Phoenix.

To become concerned about at least one problem endangering the student's future.

To be prepared for a role in responsible leadership and participation in the natural community.

To be knowledgeable about the Phoenix Comprehensive Plan 1990.

To identify the sources and components of air pollution.

To list the changes that occur in a photochemical smog.

To interpret the air pollution index.

To compare statistically the use versus the absolute need of the local and world water supply.

To identify the sources and types of water pollution in Phoenix.

To observe the chemical conditions necessary for the proper disposal of waste products.

To outline the steps involved in a recycling process.

OBJECTIVES (Cont'd)

To analyze the economics of recycling.

To examine the potential ways wastes can be converted into different useful products (cement blocks from ground up wastes.)

To list the advantages and disadvantages of various packaging materials and methods.

To give examples of the ways society (industries and advertising) has conditioned us to be wasteful.

To inventory one's personal consumption and possessions.

To examine the extent to which industries city-wide are combatting their pollution problems.

To investigate the ramifications of government regulations for personal welfare.

To determine the effectiveness of present legislation against pollution.

To be made aware that the quality of our environment is in jeopardy.

To formulate intelligent political, social and personal decisions in view of our pollution problems.

COURSE CONTENT
SUMMARY OF CITY GOVERNMENT ACTIVITIES

MAYOR AND CITY COUNCIL

The Mayor and six City Council members constitute the elected officials of the City of Phoenix. The Council is the legislative, or policy-making body of the City government. The Mayor and Council members are elected at large on a non-partisan ballot for two-year terms. The Mayor receives a salary of $6,000 per year plus a contingency fund of $2,000; the salary of Councilmen is $3,000 per annum. The Council holds formal meetings each Tuesday at 10 a.m. in the Council Chambers.

CITY MANAGER

The City Manager of Phoenix is the administrative head of the government and is responsible to the City Council. He is appointed by the City Council solely on the basis of executive and administrative qualifications with special reference to his actual experience or knowledge of the duties of his profession. The City Manager appoints and may remove all officers of the City except the Superintendent of Parks and Recreation who is appointed by the Parks Board. He is in charge of preparing the City's annual budget. Since the budget is a "plan of operation," the development of the budget is a never ending process.

PUBLIC WORKS DEPARTMENT

The Public Works Department, the City's largest department, is broken down into seven divisions:

The Division of Communications is responsible for the planning, development and maintenance of all City communications facilities and equipment and operation of the City telephone switchboard.

The Division of Building Maintenance provides maintenance, operation and custodial services for all City buildings, except the Airport and Parks Department. Some of the buildings maintained include the new ten-story Municipal Building, the Police Building, the Municipal Building Annex, the City Courts Buildings, and Library Buildings.

The Division of Electrical Maintenance is responsible for installation and maintenance of traffic signal systems and maintenance of electrical installations in municipal buildings and specialized electrical equipment at parks, water and sewer treatment plants, and Sky Harbor Airport. This division is also responsible for planning street lighting installations, which are made under contractual agreements with Arizona Public Service and Salt River Project.

The Division of Traffic Engineering is responsible for planning, supervising, designing and operating a modern and efficient traffic system throughout the City. To reduce traffic hazards and accidents, operations are coordinated with Police, Engineering, and other City departments. Traffic Engineering manufactures, maintains, and installs all traffic signs and street name signs and paints street lane and center lane lines, pedestrian crosswalks, and channelized intersections. The Division also installs and maintains all parking meters and is responsible for planning and designing traffic signal installations.

The Division of Street Maintenance and Sanitation is responsible for street maintenance, street sweeping; maintenance of storm sewers; garbage and trash collection and disposal; and vacant lot cleaning programs. The division is broken down into two main sections: Street Maintenance and Sanitation.

The Street Maintenance section maintains approximately 2,008 miles of City streets and 1,185 miles of alleys. The division operates a piece of equipment called the slurry seal truck. Slurry seal is a mixture of asphalt and fine aggregates which is used as a method of preventive maintenance.

The street cleaning activity provides motor broom sweeping for approximately 1,669 miles of paved streets with curb and gutter. Sweeping is accomplished about every eight to ten days on the majority of streets. Major streets are swept more frequently. The Sanitation section is responsible for the collection and disposal of garbage and trash as well as for cleaning vacant lots. Over 215,000 tons of City garbage are collected by this section yearly. The trash collection activity is responsible for picking up non-containable yard refuse and large items of household refuse every other week from 190,200 residents. The disposal activity is responsible for the elimination of refuse collected by City personnel and refuse which is delivered to two City landfills by private organizations and individuals.

The Division of Engineering is responsible for providing all engineering services for the City. This includes administration of street construction, improvement districts, all building and other facility construction contracts, general drafting and mapping services and engineering design services.

The Division of Mechanial Maintenance maintains all City-owned vehicles. This activity provides supplies such as gasoline and oil, schedules and completes a preventive maintenance for all motorized equipment, and makes both major and minor repairs as required.

BUILDING AND HOUSING SAFETY DEPARTMENT

The Building and Housing Safety Department is responsible for enforcing provisions of the various building codes and the zoning and sign ordinances, as well as administration of the building conservation and lot cleaning programs and coordination of all programs in the area of housing and home improvement. The department is divided into two divisions:

The Division of Building Inspections is responsible for the enforcement of the provisions of the various building codes, the zoning and sign ordinances, and inspecting structures and equipment for hazardous conditions.

The Division of Housing Services is responsible for the administration of the building conservation, lot cleaning, and the home improvement programs.

FINANCE DEPARTMENT

The Finance Director is responsible for the administration of the City's financial affairs. He is responsible for long-range financial planning, directing the preparation of annual and capital budgets, planning of bond sales, and coordinating the six divisions which carry out the Finance Department activities: Accounts, Purchases and Stores, Treasury, Research and Budget, Real Estate and Management Information Systems.

CITY CLERK

The City Clerk is the custodian of official City records, which include City Council meeting minutes. This office assists in preparation of the agenda for Council meetings and releases all legal advertising for the City.

CITY COURT

The City Court consists of the Administrative, Criminal and Traffic Divisions.

The Criminal Division hears cases involving misdemeanor violations of City ordinances and State laws within the City limits. City Court has no jurisdiction over felony cases, which are heard in the County Courts.

The Traffic Courts Division is responsible for adjudicating traffic violation cases, including moving vehicles and parking citations. This division includes the traffic violations bureau which prepares court dockets, maintains traffic violations records, collects all fines and forfeitures for traffic violation cases.

PLANNING DEPARTMENT

The Planning Department is responsible for guiding the physical development of the City. This department has two divisions: Plan Coordination and Plan Development.

The Division of *Plan Coordination* is responsible for preparation and revision of a comprehenisve zoning plan and for making recommendations on zoning changes requested by citizens.

The Division of *Plan Development* is responsible for developing long-range plans for land use and for the development of public facilities. This division is responsible for developing an overall plan for City development by conducting economic research and studies of land use and population trends.

HUMAN RELATIONS DEPARTMENT

This small but very important department was established in 1964. It is responsible for encouraging nondiscriminatory practices and mutual respect and understanding among all citizens. The Human Relations Department conducts programs of information and education by cooperating with both governmental and nongovernmental organizations. The City of Phoenix also has a Human Relations Commission, appointed by the City Council in 1963, which serves in an advisory capacity.

PERSONNEL DEPARTMENT

The Personnel Department is responsible for supplying City departments with qualified job applicants through recruitment and testing programs. This department conducts orientation, in-service training, counseling programs and conducts an employee medical program for City employees.

LAW DEPARTMENT

This department is the legal representative of the City Council, the City Manager, and all City departments and divisions.

The City Attorney's office is responsible for representing the City in all law suits filed by or against the City. This section also is responsible for the preparation of ordinances, resolutions, agreements, leases and other legal documents.

The City Prosecutor's office is responsible for prosecuting criminal complaints against persons charged with misdemeanor violations of City ordinances or State laws when the violation occurs within the City limits. This office is also responsible for prosecuting traffic violators cited by the Police Department.

POLICE DEPARTMENT

The Police Chief's office is responsible for overall administration and control of the Police Department in carrying out the department's goals of protecting life and maintaining law and order.

The Division of Field Operations is responsible for all criminal police patrol and preliminary criminal investigation and reporting. The division also enforces traffic laws and is responsible for accident investigation and records, parking and intersection control, service of misdemeanor warrants, and policing at special events.

The Division of Investigation and Service is responsible for the investigation and follow-up of crime. This division is also responsible for maintaining records and identification files, the detention and custody of prisoners, and police communications.

FIRE DEPARTMENT

In addition to extinguishing fires, the Fire Department is responsible for the prevention of fires and loss of life and property. The department has two divisions: Fire Prevention and Fire Fighting.

The Fire Prevention Division is responsible for fire prevention programs. These consist of fire safety education, inspection for fire hazards, and assisting the City Prosecutor in enforcement of the fire prevention code.

The Division of Fire Fighting has the responsibility for preventing loss of life and property, confining fires to their point of origin, and extinguishing fires with a minimum loss. Fire fighting personnel inspect fire hydrants and make home fire inspections. The division operates out of 28 fire stations.

LIBRARY DEPARTMENT

The Library Department is responsible for furnishing the public with all types of educational and technical publications as well as general fiction. Extensive reference and research facilities are available at the Central Library.

In addition to the Central Library, the City of Phoenix maintains two bookmobiles and six branch libraries. Schedules for the bookmobile routes may be acquired at the Central Library.

PARKS AND RECREATION DEPARTMENT

The Phoenix Parks and Recreation Department is responsible for the acquisition, development, and maintenance of all park facilities. The Parks and Recreation Department is headed by the Parks and Recreation Superintendent, who is appointed by the Parks Board.

The Division of Park Maintenance is responsible for the care and improvements of City parks, recreation areas, park buildings, parkway trees and median islands and other municipal grounds such as the Airport, Civic Center, Muncipal Stadium, Library, and Municipal Building.

The Division of Recreation is responsible for providing a broad program of organized recreational activities at City parks, special areas and, in cooperation with the school district officials, at school playgrounds. This division provides trained leadership, equipment, and special supplies necessary to conduct the City-wide recreation programs.

The Division of Golf Courses is responsible for the maintenance of 18-hole courses at Encanto, Maryvale, and Papago Golf Courses and a 9-hole course at Encanto.

The Division of Archaeology maintains and operates the museum located Pueblo Grande. A comprehensive program has been developed to furnish historical information on the Salt River Valley and the State of Arizona through illustrative lectures, displays, literature and correspondence.

WATER AND SEWERS DEPARTMENT

The Water and Sewers Department is responsible for furnishing an adequate supply of water suitable for domestic use and for disposal of sewage. The Water System is operated as a fully self-supporting public utility. The Sewers System has responsibility for operating and maintaining a sanitary sewerage system. This department is broken down into five divisions:

The Division of Water and Sewers Engineering provides engineering services for the entire department. These services include designing overall additions to the water and sewer systems; checking project designs prepared by consulting engineers, and maintaining quarter section maps, and fire hydrant maps.

WATER (Cont'd)

The Division of Sanitary Sewers operates two sewage treatment plants: The 23rd Avenue Sewage Treatment Plant, and the 91st Avenue Sewage Treatment Plant--both are located on the Salt River and have a combined treatment capacity of 90 million gallons per day. The 91st Avenue Sewage Treatment Plant treats not only sewage from the City of Phoenix, but on contract disposes of sewage from Glendale, Mesa, Tempe and Scottsdale.

The Division of Water and Sewers Accounting is responsible for reading approximately 150,000 meters each month and forwarding this information to Management Information Systems of the Finance Department for billing. The division also handles billings for charges for sewers services located outside of the City limits.

To insure Phoenix residents of an adequate supply of water in the years to come, the Division of Water Production operates several facilities: (1) Deer Valley Treatment Plant, (2) the Verde Treatment Plant and Wells, (3) the Squaw Peak Treatment Plant, (4) Reservoirs and Booster Pumps, and (5) Wells, Storage and Booster Stations. Total water production for the present year will run in excess of 46 billion gallons. The Division of Water Distribution is responsible for the operation and maintenance of over 2,500 miles of water distribution mains, 26,500 water valves and 11,000 fire hydrants.

AIRPORTS DEPARTMENT

The City's other self-supporting utility is Sky Harbor Airport. It is the most rapidly growing City function. This growth is a direct reflection of both the national growth of the aviation industry and the continued growth of the Phoenix metropolitan area.

The Airports Department is responsible for the development, operation, and maintenance of this rapidly expanding utility. An estimated 3,100,000 airline passengers yearly use Sky Harbor Airport. Sky Harbor also is a major facility for operation of private aircraft, as in the Phoenix-Litchfield Airport recently acquired from the Federal government.

PHOENIX CIVIC PLAZA

Early in the 1966-67 fiscal year the City Council approved proceeding with development of an auditorium-convention center, since named the Phoenix Civic Plaza. The decision was made after extensive studies were conducted by Stanford Research Institute, a consulting firm, and a 40-member citizens committee, which recommended that the center be constructed.

The center is being built in a six-block area between Washington and Monroe Streets and 2nd and 5th Streets. Land acquisition began in the 1966-67 fiscal year financed with special revenue sources earmarked by the City Council and $500,000 in 1961 Parks bond funds approved by the Parks Board and the City Council.

OPERATION LEAP

Operation LEAP (Leadership and Education for the Advancement of Phoenix) is a part of the City of Phoenix family of programs and services. Establishment of Operation LEAP was spearheaded by the Mayor and the City Council and a number of civic and business groups in Phoenix.

BOARDS AND COMMISSIONS

Because of the wide range of problems inherent in a growing city the size of Phoenix, the City Council elicits citizen participation and advice by appointing advisory boards and commissions. At this time there are over 30 such boards and commissions, such as the Environment Commission.

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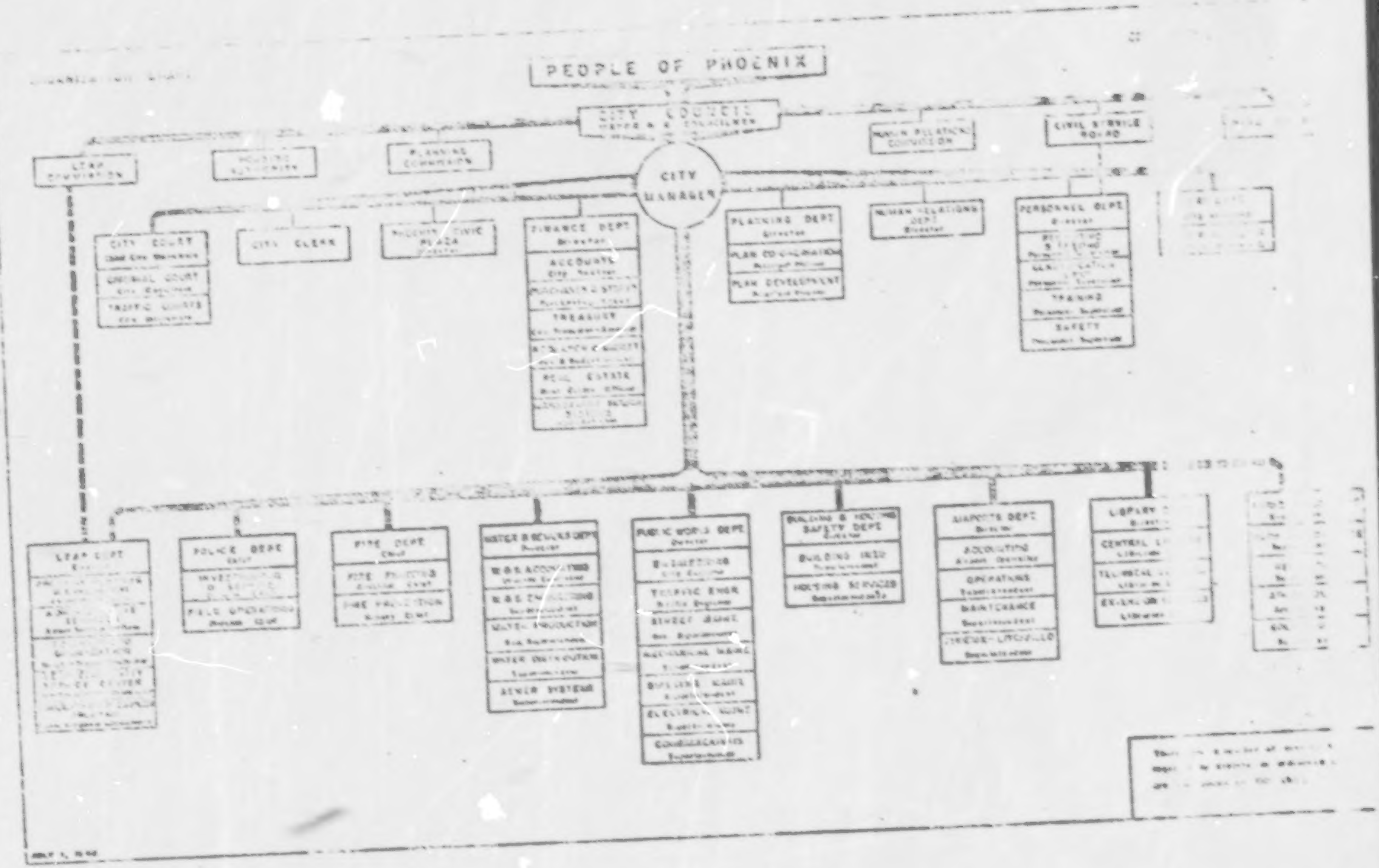
PEOPLE OF PHOENIX
CITY COUNCIL
MAYOR & 6 COUNCILMEN
CITY MANAGER
LEAP COMMISSION
HOUSING AUTHORITY
PLANNING COMMISSION
HUMAN RELATIONS COMMISSION
CIVIL SERVICE BOARD
CITY COURT
CRIMINAL COURT
TRAFFIC COURTS
CITY CLERK
PHOENIX CIVIC PLAZA
Director
FINANCE DEPT
Director
ACCOUNTS
City Auditor
PURCHASING & STORES
TREASURY
RESEARCH & BUDGET
REAL ESTATE
PLANNING DEPT
Director
PLAN COORDINATION
PLAN DEVELOPMENT
HUMAN RELATIONS DEPT
Director
PERSONNEL DEPT
Director
RECRUITING & TESTING
CLASSIFICATION & PAY
TRAINING
SAFETY
LEAP DEPT
POLICE DEPT
Chief
INVESTIGATION & SERVICES
FIELD OPERATIONS
FIRE DEPT
Chief
FIRE FIGHTING
FIRE PREVENTION
WATER & SEWERS DEPT
Director
W & S ACCOUNTING
W & S ENGINEERING
WATER PRODUCTION
WATER DISTRIBUTION
SEWER SYSTEMS
PUBLIC WORKS DEPT
Director
ENGINEERING
TRAFFIC ENGR
STREET MAINT
MECHANICAL MAINT
BUILDING MAINT
ELECTRICAL MAINT
COMMUNICATIONS
Superintendent
BUILDING & HOUSING SAFETY DEPT
BUILDING INSP
HOUSING SERVICES
AIRPORTS DEPT
Director
ACCOUNTING
OPERATIONS
MAINTENANCE
LIBRARY DEPT
CENTRAL LIBRARY
TECHNICAL
EXTENSION
Librarian

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CITY OF PHOENIX

OFFICE OF THE CITY MANAGER
June 10, 1969

To the Honorable Mayor and City Council:

The proposed annual budget for the City of Phoenix for the fiscal year beginning July 1, 1969, is submitted for your consideration in accordance with the City Charter, City Code and State Statutes.

The recommended expenditures total $80,415,680 of which $59,352,319 is for general governmental functions, $14,450,100 for the Water System, $5,009,004 for the Airports Department, and $1,603,257 for the Phoenix Civic Plaza.

The Water System and the Airports Department are self-supporting and the Civic Plaza is supported by excise taxes earmarked exclusively for that purpose. The 1969-70 budget totals compared with 1968-69 budget and estimated expenditures are shown in the table below.

Function	1968-69 Budget	1968-69 Estimated Expenditures	1969-70 Recommended Budget	Percent 1969-70 over (under) 1968-69 Adopted Budget	Percent 1969-70 over (under) 1968-69 Estimated Expenditures
General Governmental Functions	$54,379,390	$52,384,543	$59,352,319	9.1%	13.3%
Water System	14,401,404	14,134,757	14,450,100	.3	2.2
Airports	4,240,066	4,653,768	5,009,004	18.1	7.6
Phoenix Civic Plaza	1,342,465	1,998,601	1,603,257	19.4	(19.8)
Total (a)	$74,364,125	$73,161,669	$80,414,680	8.1%	9.9%

(a) The excess of 1968-69 expenditures from restricted funds for Airports and the Phoenix Civic Plaza are being financed from [illegible] balances from 1967-68 and revenue collections during 1968-69 that were greater than originally anticipated for these functions.

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The table below briefly summarizes the entire proposed budget, indicating major revenue sources and recommended appropriations by major function.

PROPOSED 1969-70 ANNUAL BUDGET

Resources by Major Source—Appropriations by Major Function
(In Thousands of Dollars)

Resources			Appropriations		
Source	Amount	% To Total	Function	Amount	% To Total
City Sales Tax	$17,910	30.2%	Law Enforcement	$13,555	22.8%
City Property Tax	11,751	19.8	Streets and Highways	10,735	18.1
State Sales Tax	9,490	16.0	Sanitation	6,534	11.0
Cigarette and Liquor Taxes	4,504	7.6	Fire Protection	5,973	10.1
State Gasoline Taxes (a)	3,671	6.2	Parks and Recreation	5,436	9.1
Automobile In-Lieu Tax	2,221	3.9	Sanitary Sewers	3,899	6.6
Fines and Forfeitures	1,950	3.3	Public Works Services (b)	2,733	4.6
City Utility Transfers	1,628	2.7	Libraries	1,899	3.2
Current Service Charges	1,627	2.7	Building & Housing Safety	1,327	2.2
Parks and Library Fees	965	1.5	Contingencies	950	1.6
Unrestricted Cash Balance	365	.6	Community Services	465	.8
All Other	3,325	5.6	All Other (c)	5,875	9.9
Total Governmental	$59,353	100.0%	Total Governmental	$59,353	100.0%
Water System (a)	14,450		Water System	14,450	
Airports (a)	5,009		Airports	5,009	
Phoenix Civic Plaza (a)	1,603		Phoenix Civic Plaza	1,603	
Total Non-Governmental	$21,062		Total Non-Governmental	$21,062	
GRAND TOTAL	$80,415		GRAND TOTAL	$80,415	

(a) Includes [illegible] cash balances restricted for capital improvements from Major Gasoline Tax, Water System, Airports, and Phoenix Civic Plaza.

(b) Includes Engineering [illegible], District Engineering Services, Mechanical Maintenance, Communications, [illegible] and Sanitation General Administration.

(c) Includes Mayor and Council, City Manager, City Clerk, Elections, Finance, City Attorney, Personnel, Planning, Human Resources, Building and Electrical Maintenance and LEAP.

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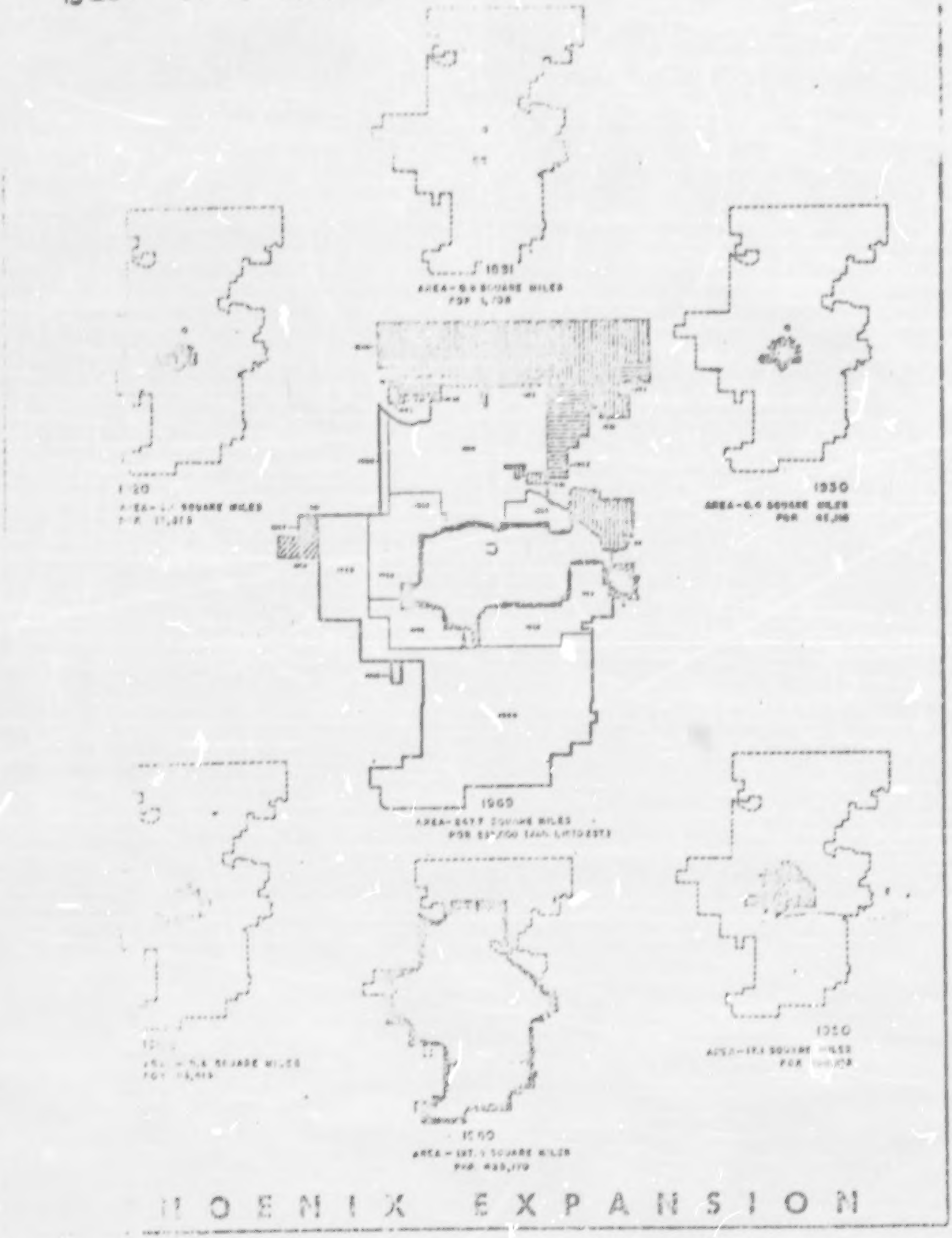
1881
AREA – SQUARE MILES
POP 1,708
1920
AREA – SQUARE MILES
1930
AREA – SQUARE MILES
1969
AREA – 247.7 SQUARE MILES
1940
AREA – SQUARE MILES
1960
AREA – SQUARE MILES
1950
AREA – 17.1 SQUARE MILES
POP

PHOENIX EXPANSION

SUMMARY OF POLLUTION PROBLEMS

Probably the most serious pollution problem, especially in Phoenix, is air pollution. All life depends upon a thin 8-mile layer of air surrounding the earth. Harmful gases and tiny particles are being spewed into this vital air zone at an alarming rate. Even the upper layers of our atmosphere may be affected. No one is certain of the effect of upsetting the delicate balance of some vital components as far as the earth's protection is concerned, such as carbon dioxide, ozone, and particulate matter. Will it heat or cool our earth? Will there be another ice age or will the seaboards be submerged in the ocean as the great icebergs melt? Worst of all, air pollution is affecting the entire atmosphere of our planet because of wind circulation patterns. Smog has been observed over oceans and even the North Pole. The components of pollution are roughly:

48%	Carbon monoxide
15%	Sulfur oxides
15%	Hydrocarbons
14%	Particulates
6%	Nitrogen oxides
2%	Other substances, such as lead

Although carbon monoxide is the biggest pollutant, the sulfur oxides are number one on the danger scale. Sulfur dioxide, SO_2, the most common oxide resulting from the burning of fuels (especially coal from the copper smelters) is easily oxidized to sulfur trioxide, SO_3. The latter when washed down with rain becomes sulfuric acid, H_2SO_4, a very strong, dangerous acid. It is extremely corrosive and a dehydrating agent, turning cellulose-like substances, even your skin, black by removing the water and leaving carbon. Sulfur dioxide and water form a weaker acid, sulfurous acid, H_2SO_3. Carbon monoxide, CO, is very dangerous physiologically, affecting reflexes, hearing and the like, at levels above 50 to 100 ppm. Highest concentrations, about 300 ppm, are along the main thoroughfares, thus drivers are particularly affected. No wonder there are so many accidents. Among the hydrocarbons is benzopyrene, a known carcinogen. Carbon dioxide and water are "harmless" products of combustion of petrochemicals, but they, too, are critical in terms of absorbing and reradiating solar energy and may affect our climate. For instance, from 1850 to 1960 there has been an increase in carbon dioxide of 10%. Although pollution may be occuring, it becomes visible smog only when air cannot mix and move or a temperature inversion occurs--a layer of cool air is trapped under warm air (naturally temperature decreases with altitude). This is most common where there is a natural land trap--as in Phoenix surrounded by mountains --and where there is rapid cooling at night near the surface--as in the desert of Phoenix. Photochemical smog results in the real dirty brown, dangerous smog.

A photochemical reaction begins with the absorption of radiation. An absorbed photon excites the molecule. The excited molecule can dissociate, react with other molecules, rearrange itself or lose the energy by emitting other forms of energy. Sulfur dioxide, nitrogen dioxide and aldehydes absorb ultraviolet radiation and react with oxygen molecules, O_2, to form oxygen atoms, O. Oxygen atoms are very reactive and will react with O_2 to form ozone, O_3. Ozone is most vicious and is responsible for the burning sensation of the eyes and mucous membranes. It also cracks rubber. Nitrogen dioxide, NO_2, a reddish gas giving smog the brownish color, is the principal agent in the formation of ozone. NO_2 absorbs light forming nitric oxide, NO, and O. These products react with O_2 producing ozone and regenerating the NO_2. Nitrogen dioxide is thus available for repetition of the process. NO_2 is in itself quite toxic and causes illnesses ranging from irritation of the nose to pulmonary edema and emphysema. In addition, it reacts with water to form nitric acid, HNO_3, another strong, dangerous acid. Among the myriad of other products of photochemical smog are peroxides, peroxyacetyl nitrate and other reactive substances from hydrocarbons. However, many scientists feel invisible particles may even more dangerous.

Production of energy is the culprit. Following is a rough distribution of the various pollutants and their sources:

SUMMARY (Cont'd)

Millions of Tons (1968)	Carbon Monoxide	Sulfur Oxides	Nitrogen Oxides	Hydro-Carbons	Particles	Totals
Transportation	63.8	.8	8.1	16.6	1.2	90.5
Fuels (coal)	1.9	24.4	10.0	.7	8.9	45.9
Industrial processes	9.7	7.3	.2	4.6	7.5	29.3
Solid waste disposal	7.8	.1	.6	1.6	1.1	11.2
Miscellaneous	16.9	.6	1.7	8.5	9.6	37.3
Totals	100.1	33.2	20.6	32.0	28.3	214.2

Motor vehicles (i.e. internal combustion engine) are by far the biggest contributor to air pollution, especially in Phoenix. How do we cut this with a growing number each year? Americans consume 34% of the world's energy and estimated power output will jump 500% in the next 30 years.

Innumerable studies have been conducted showing the health damage caused by air pollution. Significant increases in the United States death rate from lung cancer and emphysema are directly related to increases in air pollution. And yet only 14 states have air anti-pollution laws!

Nationwide, water pollution is little better than air pollution. Any foreign substance that degrades the quality of water is a pollutant.

SUMMARY (Cont'd)

In order of danger are: chemicals, sewage, thermal, silt and crud--from toxic chemicals to bottles and cans floating down a once-lovely stream. Virtually every United States stream, river, lake and estuary is polluted to some degree, to say nothing of the impending disaster of the ocean. Traces of poisonous mercury have made fish unfit to eat in some lakes, rivers and ocean. In the ocean, fish contain DDT and mercury; the photoplankton are suffering effects of DDT; and tons of oil are spewed or leaked each day. Much study is necessary to learn more about mercury poisoning. Most scientists agree the alkyl mercury compounds are toxic (primarily methyl mercury, a product of bacterial action on elemental mercury). Uncertainty lies with the inorganic mercury compounds. (DDT and pesticides have a story all their own!)

Industry is the biggest polluter, about 60%, even though much industrial effluent passes through municipal treatment plants. Cities are second worst, about 25%. Agriculture is third with chemical and fertilizer run-off and soil erosion. Most industries in Phoenix use city sewage (thus it is often difficult to pinpoint unusual contaminants. However, the suspicion pointing to a plant in one undisclosed contaminant forced them at one point to dispose of their own sewage secretly.) Our city sewage treatment plant is a secondary plant. Primary treatment includes such processes as agitation, screening, skimming, filtering and settling to remove substances not biodegradable.

Secondary treatment involves biological processes that decompose suspended and solution particles to final products that remain in solution or precipitate as sludge. (The sludge would make good fertilizer, but try to give it away. Phoenix cannot!) Only ten United States cities totaling 325,000 people have tertiary treatment to remove nitrates, phosphates or other chemical components, to chlorinate against pathogenic organisms and to filter any remaining solids. Ordinary sewage costs 5-10¢ per 1,000 gallons to process. A good system costs 20¢ per 1,000 gallons. Phosphates (50% contributed by detergents) and nitrates (primarily from fertilizers) cause eutrophication of lakes and rivers. As far as Phoenix is concerned, a May 6, 1971 issue of Arizona Republic showed a conflict of opinion on the danger of phosphates. Most sewage water goes on to agricultural irrigation, which some say would be helped by additional phosphate. Others question the effect of phosphate on ground water and general pollution. Nitrates, which are present in ground water sources, are dangerous to young babies--causing a condition commonly referred to as "blue baby". What about other areas in Arizona?

Thermal pollution does not immediately affect Phoenix. (However, the heat generated by the Navajo power plant has a tremendous effect on the system--both from heating the Colorado River and evaporating thousands of gallons of much needed water.) Agriculture, too, is predominantly outside Phoenix. Perhaps a problem that needs closer scrutiny is is an investigation of the need versus use of water in the Valley. Maybe we will need to use our sewage water. The world's supply of fresh water is strictly limited. Salt water is 97% of the total and almost 98% of the remaining 3% is tied up in polar ice caps. North Americans are removing twice as much from the ground water reserves as is being returned. Each person requires two quarts of water per day. Much comes from other sources such as meat, vegetables, etc. One pound of meat, for instance, required 2,300 gallons of water per day to produce. Two hundred gallons of water per day is required for a sufficient vegetable intake. This, when totaled, is close to a million gallons of water per year per person--not very efficient for two quarts of water! Beside the minimum personal daily intake, there are countless other uses --including irrigation, lakes in the desert, etc.

Although land pollution can take on many forms--such as soil abuse, land use, mineral depletion, etc.--this unit deals only with solid litter and waste that scourges our land. It is estimated that each person discards one ton of solid waste each year. There is 24,000 tons of waste each day in New York City. Statistics are staggering on just the number of junk cars that accumulate each year.

The first problem is collecting solid wastes. In spite of nationwide campaigns, much waste ends up as litter. Sweden has initiated a pneumatic device for gathering wastes. This sounds easy, efficient and inexpensive, even with some of the mechanical difficulties encountered. Once the waste is gathered, the disposal becomes the next problem. Some can be incinerated, although this too often leads to more air pollution . . . . burning of plastics can produce extremely toxic residues, in addition. Technology is available for high temperature incineration that eliminates almost all potential air pollutants and utilizes the energy to heat buildings or provide hot water. Good systems cost $20-30 per ton of waste. Land fill, the easy way until we run out of room, costs $5-10 per ton. With land fill, however, many substances, especially in the dry desert conditions, do not decompose. Aluminum cans, glass bottles and plastic containers do not decompose. Recycling is one process that should be investigated. Some states prohibit non-deposit bottles. Many researchers are using glass, plastic, etc. in covering for roads, road beds, building blocks and other useful materials. Why not plastics that decompose? When one investigates the limits of the natural resources supplying these substances, one is even more convinced of the necessity of recycling or other alternatives to cut down consumption and waste. Our economy of use and throw away must change to use and reuse.

RESOURCES AND ACTIVITIES FOR UNIT

From the list below the instructors will make assignments, and determine amount of credit to be received:

Attend a City Environmental Commission meeting.

Attend a City Council meeting.

Attend a Planning and Zoning Commission meeting.

Attend a Phoenix Growth Committee meeting.

Attend a Parks and Recreation Commission meeting.

Attend a political meeting featuring a candidate for city government.

Work as a volunteer for a political candidate.

Visit a recycling plant.

Visit a city landfill area.

Visit the city sewage disposal plant.

Visit the city water treatment plant.

Interview a city official working with any aspect of the environment.

Ride with a policeman.

Letter written by a student on any subject that is published in any publication.

Scrapbook on any ecological topic--clear ahead with instructor.

Bulletin board on ecological problem--clear ahead with instructor.

Book report from selected bibliography.

Polling citizens on problems of the city.

Field trip by bus to Inspiration Mine at Miami.

Film Project on environment--either movie or slide.

RESOURCES (Cont'd)

Conference phone interview with public official.

Guest speaker who will bring expertise on an environmental problem.

Have automobile checked by County Health for level of gas emission.

Experiments on extent of air and water pollution.

Check local industries' pollution control devices.

Analyze the auto emission regulation enforcement.

Compare the available auto emission control devices.

Identify detergents and cleaning agents low in phosphates.

Keep a file on what an individual can do to eliminate pollution.

Collect ads that a student feels encourages wasteful consumption.

Create a commercial for some aspect of the environment--any medium.

Participate in various ES projects.

FILM LIST

Ark (An introductory film for the unit)

Phoenix City Government

Air Pollution/Take a Deep, Deadly Breath - Parts I, II and III

Problems of Conservation: Air

". . . .And the Skies Are Not Cloudy All Day"

The Problem with Water is People

Problems of Conservation: Water

The Garbage Explosion

What Are We Doing to Our World? Parts I and II

The World Around Us

Megalopolis--Cradle of the Future

FINAL PROJECT

After the students have been exposed to the content of city structure and pollution problems, they will break up into three study groups to look for a solution in each of the three pollution areas. First they will determine goals that would be valid for a policy on cleaning up the environment. Some suggestions might be:

1. Protect public health.
2. Protect private enterprise system.
3. Make wise use of our natural resources.
4. Guarantee increasing production of material goods to assure a high standard of living.

Once goals have been set, a variety of approaches could be outlined, among them, hopefully, to seek reform through the government. Other options would not be excluded such as community service projects and ecology groups. The policy agreed upon should then be set forward using the background of the unit as a foundation on which to justify their proposals. Finally, a statement predicting the consequences of their policy will complete the project.

FUTURE UNITS

GOVERNMENT:

- Study of zoning
- Political action groups (Charter Government Group)
- Comprehensive Phoenix Plan 1990
- Operation LEAP
- Potential Metropolitan Government for the Valley
- Personnel procedures for employment
- Taxes

CHEMISTRY:

- Pesticides
- Fertilizers
- Food Additives
- Drugs and Cosmetics
- Household Chemical Products
- Nuclear Energy and Radiochemistry

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Student Guide to Phoenix City Government

The Challenge of Chemistry, Philip Morrigan, McGraw-Hill

SUGGESTED READING:

AEP Periodicals and Unit Books
"Our Polluted World"
"Environmental Pollution: A Question of Survival"
"The Future of Man"
Current

National Wildlife Federation's National EQ Index

The Environment Handbook, Ed. Garrett de Bell. Ballantine, 1970

Please Stop Killing Me, Ernest Snyder. Signet, NAL 1971

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"Auto Exhaust, Pollution and Weather Patterns," V.J. Schaefer Bulletin of Atomic Scientists, October, 1970

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"Two Cheers for Technology," Stuart Chase. Saturday Review, February 20, 1971

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Smithsonian

The City

Environmental Action Bulletin

Saturday Review

Time

Unit On New Towns

by

Martha Hunter

Henry Ford once said, "We shall solve the city problem-by leaving the city." He then produced the means for Americans to do so. The result has been the vast emergence of suburbs, the countless communities which ring our older urban areas. In evaluating contemporary urban America, however, many would disagree with Ford that "leaving the city" is the solution to America's urban ills.

By 1980, 90% of the American people will be living in urban areas. The suburbs will see the greatest percentage of this growth. The U.S. suburban population is expected to triple between 1960 and 1980, while the nation's population is projected to increase by 50%.[1]

The development of "new towns" or "satellite communities" provides an interesting and feasible alternative to the suburban monolith which continues to devour open land and open space. By bringing people closer to their jobs, schools, recreation and shopping as well as many other services, new town planners hope to control the movement of the auto and the resultant misuse of the land.

Many new towns have been successfully developed in Europe and the concept is being actively pursued in the U.S. as well. In this unit on planned communities, students will be asked to identify the goals and purposes of new towns, to study new town development in Europe and the U.S., evaluate new communities in Arizona according to specific criteria. Then, using the information gained, the students will plan their own 'perfect desert town'.

I. Contemporary Urban Problems

Before a high school class begins its study of new towns, one class period should be devoted to a general discussion of the central city and its satellite communities. Students should be able to list and give examples of the many problems that one associates with the inner city. What is the condition of the urban core today? A center for apathy, racial unrest and proverty, an unhealthy, unsafe, congested, polluted and blighted place to live are some of the many deplorable conditions that should be brought out in a class discussion.

Why does the central city continue to deteriorate? Has the situation always been this desperate? How has mass production affected the city? Try through indirect questioning to expand the discussion of the central city to the evolution and development of the suburbs. Why are the suburbs often called dormitory communities? Many families left the problems of the central city for the 'good life'. What does the 'good life' mean to you? Have these middle class migrants found a better existence in the American tract home? What are some of the concepts or generalizations that are sometimes made about 'suburbia'? A housewife who is bored, a housing development that is formless, unplanned and monotonous, a family who conforms or 'keeps up with' the neighbors, virgin land that is bulldozed or a commuter that is a slave to the auto and the freeway....is this the suburban 'good life' or an exaggeration of it?

II. Overview of New Towns

A. Reasons Towns Have Developed:

After examining the plight of the city and suburb, the second class meeting should be devoted to showing parts I and II of the film, "Rise of New Towns". Because every town at one time was 'new', ask your class to think of some reasons why towns were founded. Cities such as Washington, D.C. or Brazil's new capital city, carved out of the wilderness, have been developed to serve a gonvermental purpose. Other new towns such as Cape Kennedy, Florida or Los Alamos, New Mexico have been important from a military or strategic standpoint. Towns have risen in areas of great natural resources such as gold, copper or coal, as well as along rivers or harbors in order to transport goods and materials. Towns have sprung up for recreation, leisure or retirement reasons--such as McCullough's Lake Havasu City or Del Webb's famed Sun City. Another important motive for the rise of new towns, of course, is the growth of suburbs to relieve the congestion and escape the problems of downtown.

Most towns developed for a combination of reasons, yet the towns that the student will be introduced to in this film are not only 'new' but also different. What is unique about these new towns; what distinguishes them from other urban developments?

B. Definition of New Towns:

After viewing the film, students should be able to list some very basic characteristics of the 'new and different' towns. These modern cities could generally be defined as semi-autonomous, balanced communities, which provide a variety of housing and employment opportunities for all socio-economic classes. The land in a new town is viewed as an important commodity and, therefore, much of it is preserved for open space and recreation.

Cultural, educational, residential and industrial areas are located in easy reach of each other which facilitate internal movement and reduces or minimizes the commuting time. The dignity of the individual is vitally important in the plans of these new towns, which are trying to gear communities once again to the needs of man and not to the demands of the machine.

III. English and European New Towns

The new town concept is not actually a 'new' idea. In 1898 an English court stenographer, Ebenezer Howard, wrote a book entitled, Garden Cities of the Future. As an alternative to the increasing congestion in London, he proposed that new towns be built surrounded by greenbelts of open space twenty to thirty miles from London. While two of these 'garden cities' were constructed before he died in 1928, neither were very successful primarily because of their failure to attract industry from London.

Howard's garden city proposals were not activated again until 1944 when the Greater London Plan was formulated. This grand design copied his original concept of satellite cities and their greenbelts which would encircle London. Since World War II, 24 new towns and 60 expanded communities, ranging from 70,000 to 125,000 residents, have been developed to stop unchecked metropolitan growth. By drawing industry and housing from the city core, it was hoped that urban renewal efforts in London would in turn be smoother and more successful.

To help residents adapt and identify easily with the new town, the English utilized the neighborhood-town center plan.

Neighborhoods which range from 6,000 to 12,000 people have their own schools, shops, churches, cultural and recreational activities. A neighborhood cluster is then grouped around a town center in which public buildings, shopping and health services are located. It is in the town center that architectural innovations such as fountains, sculpture and mosaics have been designed and displayed.

England's limited supply of land ruled out the single family dwelling with a lawn and picket fence as impractical. By clustering townehouses, apartments or duplexes close together, the land that is saved is pooled together and used for parks and playgrounds. In order to add variety to the physical appearance of the multiple dwelling units, different architects are often contracted for an adjacent grouping. Most housing in the new communities has been heavily subsidized by the government and as a result, housing costs are quite inexpensive by U.S. standards. Consequently, only 10% of the homes are privately owned, even though the government is trying to increase this percentage.[2]

III. (Cont'd)

Perhaps because of the acute shortage of housing in London, coupled with the inexpensive living costs found in the new towns, these communities have attracted a great number of young couples and white collar workers. The more professional members of the upper class prefer to commute to the satellite cities from what they consider more 'fashionable' neighborhoods. Yet a real effort has been made to mix socio-economic classes and there seems to be little indication of the sharp class or social divisions that are often found in older British towns.[3]

To prevent the new towns from becoming dormitory suburbs with most of the residents commuting to their jobs in the central city, attempts have also been made to attract light industry to the new communities. Perhaps due to the promised adequate labor supply and the comfortable homes, the new towns have been quite successful in achieving this goal. A survey taken in Crawley, a London Ring Town, demonstrated that only 8.5% worked outside of town and only 3.6% of these in London.[4] Of the 75,000 that live in Harlow, one of England's older new towns, 84% of the population also work there.[5] One serious miscalculation made in Harlow, though, has been the failure to provide for Great Britain's increasing car ownership. When Harlow was constructed only 10% of the homes had garages, now many of the residents have their own cars and many drive to work, thus adding to the congestion and parking problems in this planned community.[6]

Cumbernauld, near Glasglow, England's most recent town, has learned from Harlow and has provided for one parking space per dwelling unit, even though this is low by American two-car garage comparison. Another concept that Cumbernauld has expanded was the separation of pedestrian and vehicular traffic. It is possible here to walk from the town center to the farthest residential area without crossing a major arterial road. The key to this accessibility is density. Three-fourths of the 70,000 live within 1/3 of a mile from the town center at the exceptionally high density of 85 people per square acre.[7]

Runcon, near Liverpool, has also learned from Harlow's mistakes. In this community, they have diverted industrial and commercial traffic from residential areas and increased access to public transportation in order to discourage use of the automobile. A special road has also been planned for the exclusive use of the buses which travel at high speeds and at frequent intervals with stops no more than 400 yards from an individual home.[8] Your backdoor in Runcon would open out onto the street, while the front door faces a network of footpaths which lead to shops and schools.

Building new towns has certainly not been limited to England. Sweden has become involved in developing new communities, particularly near Stockholm. This capital city has acquired a surrounding 50,000 acres in order to accommodate its future expansion. To meet traffic congestion problems, Stockholm extended rapid transit lines out first in order to service the five planned sub-communities...a certain reversal of the freeways following the suburban sprawl, typical of Los Angeles and other American cities.[9] One of the more outstanding of these developments is Vallingby, which is about ten miles from the center of Stockholm. Residents are able to walk to their rapid transit station and then travel ten to fifteen minutes by subway to work. Vallingby and the other sub-communities are not intended to relieve the pressure of inner Stockholm by dispersing population to new dormitory satellites. By developing cultural, entertainment and shopping facilities within the town, semi-independent communities are formed within Stockholm.

One of Europe's most promising new towns is Tapiola, approximately six miles west of Helsinki.

Tapiola's beautiful setting, varied housing, sound industrial base and population fairly evenly divided between the white and blue collar workers are some of the many reasons for its success. As other European new towns, Tapiola has benefited from national housing subsidies for low-income housing, even though the developer is a non-profit organization. Helsinki has plans for seven similar economically, balanced communities ranging from 50,000 to 200,000 people in order to absorb some of its urban growth.

IV. U.S. New Towns

The U.S. attempt at new town building began in the 1930's as part of Franklin Roosevelt's economic recovery program. Though they do not fit the true definitions of a 'new town', the 'Greenbelt' communities of Maryland, Wisconsin and Ohio are still good examples of what can be accomplished with planning. While Radburn, New Jersey is not a semi-autonomous town, its pedestrian pathways and housing variety make it a model suburb. These early attempts set important precedents in design, as well as trying to accommodate an urban population in an improved environment.

After World War II, while England and other European countries were busy planning their new communities, U.S. urban development consisted of unplanned suburban sprawl encompassing the central city. Though new towns in Europe have been sponsored and financed by the government, in the U.S. the government has left similar developments to private enterprise.

Robert E. Simon, whose initials are used in the name of his new town, Reston, is one of the new town enterpreneurs. Located 25 minutes west of Washington, D.C., the 7,100 acres is inhabited by 8,000 people, although the community is planned for 75,000.

Just as any other new town ideal, Robert Simon hopes that the people who live in Reston will also work there. Although no heavy industry is planned for the area, 15% of the land has been set aside for light industry, offices and commercial buildings. Yet nearly 75% of the resident's commute to work, though the percentage seems to be getting smaller every year.[10]

Is Reston, then, just another retreat for the white and well-to-do --further robbing the city of its vitality and need for tax money? What about the semi-skilled, low paid non-professional, who works in Reston, can he afford to live there? Or will he become a part of the planned city's own suburb? Reston's housing costs, which range from $24,000 to $45,000 make living there prohibitive for anyone but a member of the middle class.[11] Developing a balanced community is important to Robert Simon and Reston does have plans for apartments which rent for $45 for a one bedroom and $85 for a 3 bedroom.[12] Reston planners don't want to separate this low income housing from the middle income housing, thus giving the community a 'poor' neighborhood. Yet before Simon can attain his goal of an economically balanced town, he will have to receive subsidies from the government to absorb the costs of building low priced housing. Inspite of living expenses, this new town does have a good variety of ethnic and religious groups--both black and white, Catholic, Jewish and Protestant.[13]

With 85% of the homes either apartments or townehouses and only 15% single family dwelling units, Reston has largely dispensed with the 'American dream' of a house and yard.[14]

The planners have clustered homes together, as in England, using the land saved for open space. The Reston developers believe that by having homes back to back or side to side, there is much more privacy than in the traditional American tract, in which homes face each other, often giving the family a 'fish bowl' existence. Abandoning the straight street, Reston's roads form closed loops which keeps traffic out, as well as making the streets safer for children, giving them more friends within walking distance and relieving mother of her chauffeur duties. As in Cumbernauld, England, Reston has developed an ingenious system of bridges, underpasses and pathways which enable residents to walk anywhere without crossing a major vehicular road.

Very similar to Reston is developer James Rouse's Columbia, Maryland, located between Washington, D.C. and Baltimore, Maryland. Many experts in sociology, economics, transportation, government, ecology and other diverse fields were called upon to set up and establish guidelines for planning a 'perfect' town.

In order to foster human relationships and identify with the community, Columbia, using the English principle, grouped smaller neighborhoods around one village center. An elementary school, day care center and 'corner' grocery store can be found in each neighborhood, while the high school, multi-purpose community building, public library, swimming pool and tennis courts are located at the town center. Each of these village centers are then linked with Columbia's downtown, located on an artificial lake. A college, main library, theater, community auditorium as well as other shopping facilities are all part of downtown.

IV. (Cont'd)

In addition to pedestrian and bicycle pathways, Columbia has used mini-buses to link villages to each other and to the central core and to facilitate movement within the town.

Housing costs are somewhat lower than those in Reston, with prices beginning at $15,000.[15] Perhaps due to the lower living costs, Columbia has attracted more blacks, approximately 15% of the population, than Reston.

Recreation facilities include a 450 acre game preserve, golf course, lakes, riding trails, fishing, swimming pools and tennis center as well as many other seemingly endless 'things to do'.

V. Study and Evaluation of Arizona New Towns.

After studying European new towns in addition to Reston and Columbia in the United States, students should have some basic background for evaluating the new communities being developed in Arizona. Litchfield Park, Sun City, Carefree, Rio Rico, Fountain Hills and Lake Havasu City are some of the major communities that a class could research and examine. Divide the class into groups, each taking a different 'new' town to study. Encourage the students to interview the developers, take a field trip out to the town, talk with the residents as well as read available information concerning the community. Using the following criteria, have each group compare and then rate the town with the other planned communities that they have studied.

V. (Cont'd)

A. Sense of Community:

1. What kinds and variety of clubs and activities does the town provide?

2. Have neighborhoods and town centers been established to foster a sense of belonging?

3. Have the homes been laid out on the traditional suburban tract therefore minimizing the possibility of communal spirit?

4. What provisions have been made for recreational activities and facilities? How accessible or available are they? Are the facilities open to the public or is memberhsip required?

5. Is there interaction and perticipation of residents on many levels?

6. Is open space used as a potential 'mixer' of people?

B. Ecological Balance:

1. Does the town fit in with the natural terrain? Or is it bulldozing the earth and changing the ecological balance of the area?

2. If a man-made lake is planned, what water supplies are they using? Are they tapping vital and necessary resources?

3. What about noise, air and water pollution controls in the development?

4. How much undeveloped or unurbanized land is adjacent to or located on the townsite?

5. Is the development taking advantage of natural assets? Is it respecting the land, giving full expression to the terrain?

C. Education:

1. Is it an integral part of the community?

2. Does the public have access to the school during non-school hours?

3. What plans are there for adult education and classes?

4. Is there a public library, theater or art gallery available?

5. What community cultural groups, facilities and activities are planned?

6. How accessible are schools to children? Can students walk safely to school without crossing a major road?

D. Housing:

1. What is the variety of housing that is offired? Or are the surroundings monotonous and uniform?

2. What is the approximate percentage of apartments, townehouses

D. (Cont'd)

3. Can the lower income people who work there also afford to live in the new town?

4. What kinds of restrictions are placed on building and development?

5. Is there equal opportunity for housing?

6. How much does the housing sell or rent for?

7. Has the development utilized 'cluster' housing or are the homes built on large 'tracts'?

8. Is there a variety in population density?

E. Industry and Employment:

1. What industry is already located in the area?

2. What kind of environmental restrictions are placed on the industry?

3. What kinds of industry is the town trying to attract?

4. What percentage of people who live there also work there?

5. Where is the industry located in the town? Is is dispersed or in an industrial park?

6. How accessible are commercial offices and industrial buildings to delivery and shipment, to the employees and customers?

7. What provisions have been made for off-street parking, landscaping and commercial signs?

F. Transportation:

1. What access does the town have to existing state or interstate highways? Are any proposed for the area? If so, when are they to be completed?

2. What airport, railroad or bus facilities does the town have access to?

3. How is movement within the community planned? Does a resident depend on an automobile to run errands or get to work?

4. What consideration has been made for safety, for noise pollution due to trucks and cars?

5. Is there a separation of traffic coming into town and traffic 'passing through'?

6. Have pedestrian pathways been provided for? Are they separated from vehicular traffic?

7. How far is the town from a major metropolitan area? What percentage of the residents commute for work?

G. Utilities and Public Services:

1. What is the procedure used for collection and disposal of garbage?
2. What provisions are made for sewage treatment?
3. Is there adequate supply of power and water to support the area's increasing population?
4. Are the utilities placed underground?
5. Is there adequate police and fire protection as well as health and medical services?

H. Site and Location:

1. What natural growth and vegetation is indigenous to the area? What is being done to preserve it?
2. What is the terrain and is the development considering the land in its planning?
3. Is vital farmland being lost due to the development?
4. What is the population now? What is the proposed population? Can the land sustain the planned growth?
5. How are natural lakes and rivers being utilized and preserved?

VI. Planning A 'City In the Desert'

After the evaluation of Arizona's new towns is completed, one class day should be spent reviewing the group reports. If interest on the new town unit has not waned, the class could become involved in the planning of their 'perfect desert town'. Let the students select some site in Arizona which, considering all aspects, would be a good location to develop. Then, using the same individual groups, have each one select one of the criteria to study and make recommendations on concerning this new town. Planning their own town should be a good means of utilizing all the information that the class has acquired through reading and research as well as applying it to a creative activity.

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A COMPARISON OF CULTURAL DIFFERENCES IN MAN'S USE OF PERSONAL SPACE

by

Judith L. Gilbert

This paper is the culmination of five weeks of reading and research for a course called Man & Environment, a course sponsored by Project Outreach for a group of teachers from high schools in the greater Phoenix area. The course was taught at Arizona State University through the college of Architecture, the focus being on the relationship between man and his physical environment. As a meaningful evaluative measure, the professor requested a paper from each teacher, a paper which could aid other teachers in each subject area in introducing environmental materials into their own courses at their own schools.

My research led me into an area which vitally concerns every language teacher, an area usually labeled nonverbal communication, including kinesics, proxemics, and argonomics (human engineering). I approached the subject of the significance of nonverbal communication in the only way feasible to me, through the cultural process of learning a foreign language, this being my particular teaching field. Learning a foreign language means much more than merely acquiring a speech and reading facility within that language; it means putting oneself in another's shoes, becoming intimately involved in the nonverbal habits, conventions, and institutions which make up that total culture of which the language is but one part.

This paper is intended as a guide, only, to be used as an introduction, perhaps, to a year of French study, or even as part of a unit in an advanced English class. I would hope for the ideal language class, small, highly motivated, and the ideal teacher, enthusiactic and innovative, to take some of these ideas presented here and let them enhance the language learning experience beyond the conventional scope of speaking, reading, and writing. Through increased familiarity with the nonverbal elements of the French language and culture, as well as an awareness of similar elements in our language, the end result should be a greater understanding by each pupil of his own uniqueness.

In order to exploit this uniqueness, each person needs to know more about it, and about the culture which nurtures it. Lionel Trilling puts this goal in this manner: "The meaningful richness of human life is the result of the millions of possible combinations involved in a complex culture".

By studying another language and another culture, the student will eventually be brought back to himself and to self-understanding. He will be doing what Benjamin Whorf calls "dissecting nature along lines laid down by his own native language"...but he will be multiplying these lines and adding to their dimensions by his knowledge of the nonverbal elements which make up such a great part of any culture.

In the beginning was the word! Or was it?! In my experience as a student of languages, and later as a teacher, I have arrived at some conclusions about what language is and does and its unique place in the world of men. I respect language....yours, mine, the French, the Persian, the Chinese. I respect it because it is an intimate part of every human being, and because I respect people.

Language is a form of behavior. Because of this, it would logically follow that differing languages present differing world views.

Language is alive and vital and changing. It is not dead and safely embalmed in rules in a textbook.

"Language is a social institution. It has the same kind of stability and adaptability as other social institutions, from table manners to democratic government, and its conventions are just as obligatory while they last! To ask for a static language makes just as much sense, and no more, as to ask for a static society."

These are but a few of the many concepts concerning language that I toss out to my students each new year of teaching. I hope these may get some of the students to shake off the bonds of some of the conventional ideas being perpetuated in so many of our elementary schools. I like them to be "hanging loose" as they come into my class to learn a new language. They come to me to learn the French language. I help them to speak French but one of the most important things I want them to discover through this experience is themselves. Yes, we conjugate verbs; we learn voacbulary; we read the works of famous French writers; we study the history and geography of France. But all the time we are doing this, underlying each new concept that is presented, is this idea, a circular one if you will, that knowledge of other cultures leads one back to one's own culture. Knowledge of other human beings, queen or saint, leads back to self-knowledge. Our purpose as teachers, no subject areas excepted, is to show connections between ideas and reality, between life as it was or is elsewhere in the world and life right here, right now, for our students. This leads finally, in devious fashion, to the subject of this paper, to information and conclusions which I sincerely hope will be as delightful an addition to someone else's French class as I think it will be to mine, this next year.

In the beginning was body language...probably! At any rate, speech developed when its need became strong enough, but always, along with speech was this great, amorphous area, the behavior of the speaker, which so often makes a louder "noise" and a deeper impression than the actual words. The psychologist views this behavior in one way, the linguist in another. The term proxemics, coined by the anthropologist Edward T. Hall, concerns itself with the interrelated observations and theories of man's use of space as a specialized elaboration of culture. Proxemic patterns then become excellent clues to cultural differences, for they reveal what the spoken word often hides, the emotional depths of people, where the real communication is taking place.

Robert Sommer, in speaking of the title of his book, Personal Space, says the meaning is twofold: "the first is the emotionally charged zone around each person, sometimes described as a soap bubble or aura, which helps to regulate the spacing of individuals. The second usage refers to the processes by which people mark out and personalize the spaces they inhabit". Within each major culture then, there are close connections between space and status, with higher-ups having more and better space as well as greater freedom to move about. One of the major differences between the American and the French culture is easily observable in the distances that people maintain in their homes, offices, cities and overall environment.

The spacing of people and its significance sociologically and psychologically has been the subject of much research. A whole body of knowledge is available concerning the territoriality concept for animals as well as for man. This idea states that each person (and animal) wants and needs a certain area or territory just for himself. Within this territory, no matter how large or small, one finds dominance behavior, leadership behavior, etc. Victor Hugo, one of the French writers and statesmen that we study in French class, has his theory about territoriality: "Every man a property owner, no one a master". He later states in his writings: "When everyone possesses an individual territory, the reasons for one man to dominate another disappear".

In France at the time of Hugo, this certainly appeared to be true as history will bear out with the French Revolution, as well as many other large and small wars for territory, both personal and national, that wracked France.

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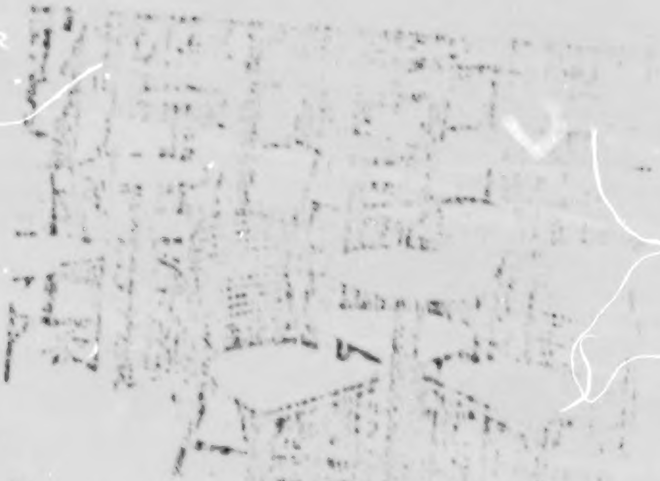

P[illegible] 1[illegible] and 20. [illegible] patterns are often [illegible] culture. [illegible] two French scenes, showing [illegible] spacing of cafe tables and a crowd of persons listening [illegible] indicate the French tendency to pack [illegible] close than do northern Europeans, English, and [illegible] suggest the resulting high sensory involvement [illegible] aspect of French life.

Territorial behavior, according to Edward Hall, is quite rigid and fixed for any stage of life within different cultures. The boundaries of the territories remain reasonably constant and the territory is in every sense of the word an extension of the organism, marked by visual, vocal, and olfactory signs. Hall labels this type of space on the proxemic level "Fixed-Feature Space". He goes on to say that "fixed-feature space is one of the basic ways of organizing the activities of individuals and groups...and governs behavior as man moves about on the earth... The relationship of fixed-feature space to personality as well as to culture is apparent in homes, hotels, and physical lay-outs of cities."

The second pattern for describing space on the proxemic level is Semifixed-Feature Space, which includes the space areas where people gather within buildings or close to them, e.g. outdoor social gathering places. A physician named Humphrey Osmond coined the following two terms to further break down Semifixed-Feature Space into two sub-categories. The first, sociofugal, applies to spaces that tend to bring people together, such as drugstore booths and French sidewalk cafes.

The last proxemic pattern is Informal Space, which takes in any spatial experiences which are for the most part outside awareness. These patterns have deep, distinct bounds which are a significant and essential part of any culture.

Under the heading of Informal Space comes a group of four distance zones, outside the awareness of most people until attention is called to it through personal examples. To save time and allow the reader to get this information in condensed form, the following will be almost a listing of short facts about each zone.

1. Intimate - stepped up sensory input-sight distorted-other senses top reaction -
    a. Close phase - in physical contact with another person-love-making, wrestling, comforting, protecting.
    b. Far phase - 6 to 18 inches-hands can reach extremities, clear vision includes upper or lower portion of face -

2. Personal -

    a. Close phase - 1½ to 2½ feet - one can hold or grasp a person -
    b. Far phase - 2½ to 4 feet - arm's length - the limit of physical domination-no body heat perceptible -

3. Social -

    a. Close phase - 4 to 7 feet - impersonal business transactions - people who work together - casual social gatherings - man talking to secretary or receptionist.
    b. Far phase - 7 to 12 feet - formal business and social matters - conversation at this distance causes neck craning and leaning from side to side to avoid intervening obstacles - used to insulate or screen people from each other - can continue to work in presence of another person without appearing rude -

4. Public -

    a. Close phase - 12 to 25 feet - evasive or defensive action can be taken if threatened - formal style in speech -
    b. Far phase - 25 feet or more - 30 feet is distance automatically set around important public figures - or anyone on public occasions - much of nonverbal is now in gestures and body stance - "frozen style" is for people who are to remain strangers -

In reading about these four distance zones and the implications of some of the information, I gathered the following differences between the French and the Americans as to their personal spacing.

1. Americans do not like to be in the Intimate Zone in public places with strangers or foreigners. Even when talking to a friend or acquaintance, they usually keep in the Personal Zone, Far Phase.

2. Americans feel that foreigners (particularly Spanish, Italian and French) get too close when talking to them. Their feelings are summed up in this way: "These people get so close to you, you're cross-eyed. It really makes me nervous. They put their face so close it feels like they're inside you."

3. Americans do not make direct eye contact with strangers, if it can possibly be avoided. They shift the gaze back and forth from eye to eye or from eye to mouth. To make direct eye contact for more than a fleeting moment constitutes "staring" which our culture tells us is impolite.

4. French people (primarily men!) eye women on the streets without this being taken as an insult to the woman. In contrast, in America, if men stare at a woman it indicates she's being put "on the make". She could then, justifiably within our cultural frame, react in anger, fear, or resentment.

5. French people use direct eye contact when talking to one another; if an American does not respond in kind, the Frenchman feels this is very impolite.

6. French people use all of their senses much more extensively in any and all of these distance zones than Americans do. It is this facet of cultural difference that accounts for the misunderstanding so many Americans hold that French people are more concerned with sexual matters than we are. The term one needs to use is sensual, not sexual. We, in America, tend to be coldly sexual, but the French are warmly sensual. This is an opinion supported only by the personal feeling of the writer.

Back to the categories of space of proxemics, let's look at some of the basic differences between the French and Americans within these particular boundaries. For convenience sake, and to allow my readers to scan and utilize this information quickly, I shall eliminate formal English again and list the various comparisons in succinct fashion:

America	France
1. city lay-out of uniform, grid pattern.	1. city lay-out of star pattern, radiating from center.
2. street intersections denote change of name of street.	2. certain landmarks denote change of name of street.
3. parks laid out with little thought for use by people, much emphasis on paved areas, neat, sterile, little detail for eye interest.	3. parks created with reverence for open areas and beauty of architecture, much thought as to their use by people, sensory details high, open, inviting areas for people to gather and enjoy one another.
4. sidewalks relatively narrow, very close to street with heavy traffic.	4. sidewalks relatively wider, with 100 foot separation from busy traffic.
5. alleys for trash, emergency vehicles, back alleys, unattractive, much wasted space.	5. alleys for bicycles, 2 CV vehicles, picturesque, created for people.
6. public toilets seemingly purposely hidden, always too few in public buildings, schools, those that are available far too dedicated to form rather than function!	6. public toilets are public, available, functional.
7. office space usually divided up equally, newcomer to office given his share of space while others cut down equally.	7. office space not taken for granted, divided in larger or smaller amounts according to central figure, new colleague given small desk facing wall.
8. each executive usually "does one thing" within a relatively free pattern, less rigid control over individuals within office.	8. key figure is central man who controls other individuals who radiate out from his office.

9.	educational system influx, varies from state to state, city to city, school to school, much emphasis on individual differences, space in buildings used in as many ways as there are schools.	9.	centralized education system, all students all over France taken the same class at the same time, emphasis on individual likenesses, space in buildings used very similarly, conventionally.
10.	in area of buying, rank's handling of space accorded to rich and poor alike, in order of arrival.	10.	standing in line considered a violation of individuality, break ranks, push ahead of others.
11.	space in houses creates separateness for family members, Mom's kitchen/master bedroom, Dad's study/den/shop/basement/garage, fragmented, individualistic function.	11.	space in houses creates involvement of family members, less emphasis on function of separateness, more on sensory involvement, togetherness.
12.	cars larger, so that personal spheres do not overlap, emphasis on speed, bulk, wasted space, less kinesthetic sense of space for rider, insulated from environment, non-sensual, interaction is competitive, aggressive, destructive.	12.	cars smaller, more personal involvement within car and without, greater emphasis on individuality, more interaction with total environment, sensual, fun-loving.

These twelve comparisons are by no means a statement of the complete picture of the treatment of space by two different cultures. They are just a beginning. No doubt they will be constantly changing as people become more and more aware of one another end of their need to learn from one another. In an area as esoteric as significance of use of personal space, interpretations will vary as the personal bias and training of the observer varies. I do not intend to reflect a good/bad or right/wrong judgment in this study, merely to illustrate one of many ways of lending relevence to the study of a foreign language (or to English).

"The real job is not to understand foreign culture, but to understand our own. All that one ever gets from studying foreign culture is a token understanding...the ultimate reason for such study is to learn more about how one's own system works...to generate a sense of vitality and awareness...which can come only when one lives through the shock of contrast and difference."

In terms of ecology, since ecology is the focus of this paper, this course and the future of mankind, one can see that a knowledge of proxemic patterns for people of different cultures serves a double purpose. First, it sheds light on our (America's) own out-of-awareness patterns and by so doing may contribute to improved design of living and working structures and cities. Second, it shows the great need for improved intellectual understanding throughout the world. "Proxemic patterns point up in sharp contrast some of the basic differences which can be ignored only at great risk. American city planners and builders are now in the process of designing cities in other countries with very little inkling that these needs vary from culture to culture. The chances of forcing whole populations into molds that do not fit are very great indeed" and the results may exact a price that Americans are unwilling and unable to pay.

In summation, whatever we can do to further understanding through our own teaching areas, this is our challenge and our responsibility. Ian McHarg's words from Man and His Environment should echo and re-echo throughout the classrooms in Phoenix, Arizona all the way around the world. "No species can exist without an environment, no species can survive, save as a non-disruptive member of an ecological community. Every member must adjust to other members of the community and to the environment in order to survive. Man is not excluded from this test."

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The Individual and His Environment

by

Barbara Sue Malpede

PREFACE

When assigned the project of writing a teaching unit, I found myself faced with a task that I could not do because of my basic philosophy of education. I do not believe that a teacher can plan a unit without involving the students who are to learn from that unit. Since I totally believe that my students must have a say in all that goes on in our classroom, I can only plan a general framework for a unit.

I have chosen what I feel may be a starting point for a unit on Man and Environment with the idea that the students will decide which direction they will want to go from here. We may spend one week on it, we may spend one month on it, or we may spend an entire semester on it.

> "And he said:
>
> No man can reveal to you aught but that which already lies half asleep in the dawning of your knowledge.
>
> The teacher who walks in the shadow of the temple, among his followers, gives not of his wisdom but rather of his faith and his lovingness.
>
> If he is indeed wise he does not bid you enter the house of his wisdom, but rather leads you to the threshold of your own mind."
>
> Kahlil Gibran
> from The Prophet

MAJOR CONCEPT

An individual is the product of his heredity and his environment.

MINOR CONCEPT

Individuals have similarities and differences.

Activities

1. Ask how classmates are alike? List out all similarities and differences. Discuss these similarities and differences in relation to age, sex, race, dress, facial features, expressions, etc.
2. Students may write an essay pointing out the similarities between two students or the differences.
3. Have students list which traits are linked with heredity and which are related to environment.
4. Have students write a short paper on why it is/is not important to recognize the differences and similarities in individuals.
5. Have a psychologist talk on the individual as a product of his environment.
6. Have speakers from various ethnic groups speak on unique features of their own culture.
7. Have each student construct a "family tree."
8. Have students talk about favorite colors, foods, music and what has influenced their choice.

MINOR CONCEPT

The family group is a result of the interaction of heredity and environment.

Activities

1. Have each student write a paper on a special family tradition.
2. Have students share in a class discussion these traditions.
3. Have members from various ethnic groups discuss the differences in family structure with the class.
4. Have students prepare a debate on whether or not the family will continue to exist.
5. Have students discuss or write a paper on how they think the customs within a given culture affect the individual in growth and development.

MINOR Activities (Cont'd)

6. Have the students discuss the value of preserving attitudes and customs of a particular area or ethnic group.
7. Show the film Four Families.
8. Have students find magazine articles concerning family life and bring them into class for display.
9. Have students bring in pictures of their own families and make a bulletin board display of them.
10. Watch for related television programs.
11. Check filmstrip list from Guidance Associates for related use.
12. Find related books in library and make a reserve section for your class. Require that they read and report on at least one book.

MINOR CONCEPT

The environment influences the behavior of individuals within the family. Individuals have different environments - even within the same family.

Activities

1. Have a discussion on the topic that no two children are ever alike.
2. Investigate and discuss the following questions:
    a. How are the first child's relations with the parents different from those born after him?
    b. What are the advantages and disadvantages of being: an only child, the oldest, the second child, having all brothers or all sisters?
    c. What are the life cycles of the family? What concerns are presented by each cycle? Determine the changes each cycle may make in the environment.
    d. How has your family's environment changed since your parents were first married.

        Changes in job or financial status
        Changes in home (Size and location)
        Increases in size
        Changes in city or community
        Changes in values or goals

    e. What are some needs of parents?
    f. What do siblings give one another?

Activities (Cont'd)

  g. Why is it that two siblings who quarrel at home present a unified front when someone interferes with one of them?
  h. What makes siblings respond differently to people and things around them?

3. Have each student interview someone who is an only child and someone who has several sisters and brothers. Have them compare the advantages and disadvantages of each.
4. Students may diagram their own family in terms of age of parents, arrival of children and the probable period when the last child will be gone from home.
5. Have a class discussion summarizing the ways in which family members may have different environments:
   - Position in family
   - Age and sex of siblings
   - Position in parents family cycle.
6. Have students do role playing depicting various family situations. They might do one where a family cooperates to solve family problems and they may do one where cooperation is not evident.
7. Show filmstrips concerning the family. Again, Guidance Associates has several excellent ones.
8. Have students discuss family size in relationship to the needs of the family.
9. If interest is shown, discuss birth control and related issues.
10. Have students write a paper on ways in which their attitudes toward family life have changed.

MINOR CONCEPT

An individuals behavior stems from an interaction between his heredity and environment.

Activities

1. Have students discuss how they behave in different situations, e.g. church, school, home, dances, games, etc.
2. Have a physical experience in the classroom contrasting two moods one with loud music, close contact, bright lights, etc., and one with soft-music, lots of space, and soft lights.
3. Have students write a paper telling how they felt in each of the two above mentioned situations.
4. Have students compare living in the country with living in the city. Have them relate the environment to the type of personalities the individuals might have.

Activities (Cont'd)

5. Have a discussion about different family styles as they relate to where the family lives.
6. Have them relate values to the environment. Does the city person value different things? Is the Southerner more prejudiced?
7. Have students look up and report to the class the food habits of people in other regions and then, in classroom discussion, compare those food habits with those in our own community.
8. The above could be extended to the food habits of other countries.
9. Have the students debate whether "soul food" is regional or ethnic.
10. Have students illustrate how the resources of a community or region influence eating habits or customs.
11. Run a non-verbal sensitivity group having students become acquainted with their personal space and how violation of it affects them.
12. Show films or filmstrips related to the topic.
13. Have an architect talk to the class about the influence of the environment on man.
14. Have a sociologist talk to the class about the influence of the environment on man.
15. Have a psychologist talk about how man tries to escape from his environment through the use of drugs. This alone could lead to an entire unit on drugs, if the class chose to go in that direction. The teacher should certainly be prepared to do a unit on drugs at the point as they are an escape from our environment.
16. Have a section set aside in the library concerning the environments influence on behavior and have students read a book or article on the same.
17. Have students divide into groups and have small discussions on some day.
18. Require a creative project from each group related to this concept.

At this point, or really anywhere, the students will decide which direction they want to go: Focus on Cities, Focus on Ecology, Political Action or another topic of their choice.

The students will have a great deal of say in which activities that they want to do and will probably have ideas for activities that I haven't even thought about.

My role as a teacher will be to have the knowledge and the initiative to bring in resources and activities for whichever direction the class might choose.

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